Interactions and Side Effects of Herbal Plants

Interactions and Side Effects of Herbal Plants:

Revealing Ayurveda

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PREFACE

Ayurveda's ancient wisdom regarding health and well-being is a holistic and integrated approach for a healthy lifestyle, based on balancing body, mind and spirit that has existed for thousands of years. Now, there is a growing, global interest in nature and traditional medicine; ayurvedic herbs are slowly and cautiously being added into the mainstream health care system, as an additional awareness that we can pursue herbal remedies along with conventional medicines in a supportive way for our health. It is also essential to have a clear understanding of herbal actions, side effects and interactions with conventional medicine and diet.

The goal of this book, 'Interactions and Side Effects of Herbal Plants: Revealing Ayurveda', is to illuminate both the promises and the complexities of this traditional healing system in a modern context. It serves as a comprehensive guide for practitioners, researchers, students and health conscious readers, offering a clear view of the rich landscape of Ayurvedic herbs, their mechanisms of action, synergistic effects, potential side effects and their interactions with food, nutraceuticals and conventional medications.

The book also traces the origins and evolution of Ayurveda, its foundational principles, diagnostic methods and its growing role in integrative medicine today. It offers in-depth profiles of key herbs with detailing their traditional applications and scientific understanding of their effects. It also addresses crucial issues related to safety, standardization, regulation and the responsible use of herbal products.

Additionally, the book highlights current research and clinical trials validating the effects of these herbs, as well as exploring future possibilities through innovations in biotechnology, big data and personalized medicine.

May this book be a step toward more safe, more effective and more integrative methods of health and healing through the eyes of Ayurveda.

Dr. Mital N. Manvar

CHAPTER 1

INTRODUCTION TO AYURVEDA

Overview of Ayurveda

Ayurveda is one of the oldest holistic healing systems in the world, which is originated in India more than 5,000 years ago. It originated from two Sanskrit words "ayur," or life and "veda," meaning knowledge or science. Literally translated, its original core principles were based around life and everything surrounding it. Ayurveda focuses on health and wellness with emphasis on balance among body, mind and spirit (Lad, 2002). Unlike the traditional conventional medicine, which focuses on mere symptom-oriented treatment, Ayurveda works on the lines of prevention and trains its followers to understand what their particular body constitution would be and to be in harmony with the natural rhythms of life (Lad, 2002).

Objective of Ayurveda

The central tenet of Ayurveda is encapsulated in the dictum-

> "Swasthasya Syasthya Rakshanam, Aaturashcha Vikar Prashamanam"

which translates as "Preservation to health of healthy person and treating ailmnents with different methods of treatment mentioned in Ayurveda." (Charaka, 1998). This statement underlines Ayurveda's focus on the promotion of health and prevention, as well as healing and alleviating ailments when necessary.

Concepts of Ayurveda

1. **Holistic Approach:** Ayurveda is basically a holistic approach through mind, body and spirit. It looks to live with nature and leads a healthy lifestyle along with respect towards diet, exercise and meditation with proper living ethics (Lad, 2002).

2. **Individualized Treatment:** Ayurveda considers that each person is unique and offers its treatment to every patient keeping in mind his constitution, health and environmental condition.
3. **Preventive Care:** Preventing illness is the essence of Ayurveda. It promotes longevity and vitality through daily routines (Dinacharya), seasonal routines (Ritucharya) and proper diet (Jaiswal & Williams, 2016).
4. **Natural Therapies:** Ayurveda uses natural healing agents, such as herbs, minerals, oils and other natural substances, to restore health and balance.

Origins and Development of Ayurveda

Ayurveda was first found in the ancient texts of Vedic people known as Rigveda and Atharvaveda. Those texts talk about medicinal plants and their treatments (Jaiswal & Williams, 2016). Until these were put in writing some 1500 BCE, all the knowledge was orally transmitted from one generation to the other. The primary classical texts of Ayurveda are:

1. **Charaka Samhita:** This is attributed to Maharshi Charaka. He is believed to be the 'Father of Ayurveda'. Charaka Samhita is dedicated for internal medicine (Kayachikitsa) in which it narrates numerous diseases, diagnoses and treatments along with preventive measures according to Charaka (Charaka, 1998).
2. **Sushruta Samhita:** It is attributed to the Maharshi Sushruta who is considered as "Father of Surgery". Sushruta Samhita is considered to be a seminal text on surgery (Shalya Tantra) and it contains detailed accounts of surgical operations, instruments and postoperative care (Sushruta, 1907).
3. **Ashtanga Hridaya:** It is written by the Acharya Vagbhata. It has the essence of another Samhita like Charaka Samhita and Sushruta Samhita. It is divided into eight branches, covering all aspects of Ayurveda (Ashtanga Hridaya, 2004).

Evolution and Spread of Ayurveda

Ayurveda has undergone a transformation over the years by integrating knowledge from various other traditions and regions. The Gupta period (4^{th} to 6^{th} century CE) was a significant time when Ayurveda thrived, and its growth continued during the medieval period despite other medical systems gaining prominence. Ayurveda's practice spread beyond India to

other parts of Asia, and its influence can be seen in the traditional medicine systems of countries such as Sri Lanka, Nepal and Tibet (Jain, Kosta & Tiwari, 2010).

Ayurveda, in recent times, has become popular worldwide and is integrated more and more with the contemporary medical practice, as various studies and clinical research prove the principles and treatments of Ayurveda (Choudhury & Humtsoe, 2023).

Principles of Ayurveda

Panchamahabhutas (The Five Elements)

Ayurveda is based on the concept that everything in the universe, including the human body, is composed of five fundamental elements:

1. **Earth (Prithvi)**: It represents solidity and stability.
2. **Water (Jala)**: It represents fluidity and cohesiveness.
3. **Fire (Agni)**: It represents transformation and metabolism.
4. **Air (Vayu)**: It represents movement and dynamic activity.
5. **Space/Ether (Akasha)**: Represents space and expansiveness (Charaka, 1998; Lad, 2002).

These elements combine in various proportions to form the three doshas, which are the cornerstone of Ayurvedic physiology and pathology.

Tridosha Theory (The Three Doshas)

Vata, Pitta and Kapha are the three doshas. The doshas consist of the biological energies ruling all physical and mental processes. It is thought of as life's three pillars. The dosha comprises two aspects of the three, namely water, ether, earth, fire, air, which are as follows:

1. **Vata** (Air and Ether): It is in charge of movement, circulation, respiration and elimination. It is light, dry, cold and mobile by nature.
2. **Pitta** (Fire and Water): It governs digestion, metabolism and transformation. It manifests qualities in the form of hot, sharp, oily and intense.
3. **Kapha** (Earth and Water): It is responsible for structure, stability and lubrication. Its qualities are heavy, slow and steady, and moist (Charaka, 1998; Lad, 2002).

Prakriti and Vikriti

- **Prakriti**: This is a fundamental constitution of a person at the moment of conception. Doshas are a unique combination, which determines all characteristics - physical, mental and emotional. Knowledge of Prakriti helps make appropriate choices in lifestyle and diet, which will be helpful to maintain balance and health (Ashtanga Hridaya, 2004).
- **Vikriti**: Refers to the current state of imbalance in the doshas. Factors such as diet, lifestyle, stress and environmental conditions can disturb the doshic balance, leading to Vikriti. Ayurvedic treatment aims to correct these imbalances and restore harmony (Ashtanga Hridaya, 2004).

The Concept of Agni (Digestive Fire)

Agni, the digestive fire, is a central concept in Ayurveda. It is responsible for transforming food into energy and nutrients and for the elimination of waste products. Balanced Agni ensures good health, while impaired Agni can lead to the accumulation of toxins (Ama) and various diseases. Ayurveda identifies different types of Agni, each associated with specific digestive functions (Charaka, 1998).

Dhatus

Dhatus refers to the seven tissues (Rasa- lymph, Rakta-blood, Mamsa-flesh, Meda-adipose tissue, Asthi-bones, Majja-nervine tissue, and Shukra-reproductive tissue) that make up the body's structure and function. Proper nourishment and balance of the Dhatus are essential for health (Charaka, 1998; Lad, 2002).

Malas (Excretory material)

Malas are the metabolic waste products which need to be removed from the body periodically. Normal functioning of the Malas is very important to maintain health. These tissues or Dhatus are prone to wear and tear so that mala is formed from them (Charaka, 1998; Lad, 2002).

Srotas (Channels)

Srotas are the channels through which nutrients, waste and vital energies circulate in the body. There are numerous Srotas, each associated with

specific functions and organs. Blockages or imbalances in the Srotas can lead to disease. Ayurvedic treatments often focus on clearing and balancing these channels (Lad, 2002).

Ojas

Ojas is the essence of all bodily tissues and the source of physical and mental strength, vitality and immunity. Ojas is considered the ultimate product of healthy digestion and metabolism (Lad, 2002).

Ama

Ama is the toxic by product of improper digestion and metabolism. Ama accumulates in the body when Agni is weak or imbalanced, leading to disease. Ayurvedic treatment aims to eliminate Ama and restore Agni (Lad, 2002).

Triguna

The mental characters of human beings are attributable to Satva, Rajas and Tamas, which are the psychological properties of life collectively terms as 'Triguna'. It is related to physical, social, psychological and spiritual aspect of personality. The three qualities or domains of personality in this model are Sattva (characterized by purity and goodness), Rajas (characterized by passion or action tendency) and Tamas (with core features of dullness, darkness or destructiveness) (Lad, 2002).

Diagnosis in Ayurveda

Ayurvedic diagnosis involves a thorough examination of the patient, including:

1. **Trividha Pariksha** (Three fold Examination) (Sushruta, 1907):
    - Darshana: Visual observation
    - Sparshana: Palpation and touch
    - Prashna: Questioning and history taking
2. **Ashtavidha Pariksha** (Eight fold Examination) (Sushruta, 1907):
    - Nadi (Pulse) Examination
    - Mutra (Urine) Examination
    - Mala (Stool) Examination

- Jihva (Tongue) Examination
- Shabda (Voice) Examination
- Sparsha (Touch) Examination
- Drsti (Eyes) Examination
- Akruti (General Appearance) Examination.

Treatments in Ayurveda

Nidan Parivarjan (Avoidance of the disease-causing and aggravating factors)

Nidan Parivarjan is to avoid the disease-causing factors in the diet and lifestyle of the patients. It encompasses the idea of refraining from the precipitating or aggravating factors of the disease (Lad, 2002).

Shamana Therapy (Palliative Treatment)

Shamana therapy suppresses vitiated humour (Doshas). The process by which vitiated humour subsides or returns to normal without creating an imbalance of other humours is known as Shamana. This treatment is achieved by using appetizers, digestives drugs, exercise, exposure to sun and fresh air, etc. Palliatives and sedatives are used in this form of treatment (Lad, 2002).

Shodhana therapy (Purification Treatment)

Shodhana therapy aims at the removal of the causative factors of somatic and psychosomatic diseases. The process includes internal and external purification. The usual practices involved are Panchkarma & Prepanchakarma procedures (Lad, 2002).

Satvavajaya (Psychotherapy)

Satvavajaya treatment concerns with psychological disorders. This includes restraining the mind from the desires for unwholesome objects and the cultivation of courage, memory and concentration. In Ayurveda, the studies of psychology and psychiatry have been developed extensively and have a wide range of approaches in the treatment of psychic disorders (Lad, 2002).

Pathya Vyavastha (Prescription of diet and activity)

Pathya Vyavastha comprises indications and contraindications in respect of diet, activity, habits and emotional status (Lad, 2002).

Special treatments in Ayurveda

Panchakarma (Fivefold Therapy)

Panchakarma is the purification treatment used in Ayurvedic science. Panchakarma refers to five types of procedures intended to cleanse and restore balance to the body, mind and emotions (Ashtanga Hridaya, 2004). Before panchakarma treatment, pre-panchakarma procedures like Snehana karma (external & internal oleation therapy) and Swedana Karma (induced sweating) are applied to liquefy vitiated Doshas (Ashtanga Hridaya, 2004). The fivefold procedures (Ashtanga Hridaya, 2004) are-

(a) Vamana (Emesis therapy)
(b) Virechana (Purgation therapy)
(c) Anuvasana Basti (Oily enema therapy)
(d) Asthapana Basti (Decoction enema therapy)
(e) Sirovirechana (Nasal insufflation therapy)

Indications of Panchakarma: Osteoarthritis, Rheumatoid arthritis, Gouty arthritis, cervical spondylitis, Lumbosacral radiculopathy, Frozen shoulder, Hemiplegia, Bell's palsy, Paraplegia, Bronchial asthma, Irritable bowel syndrome, Hypothyroidism, Hyperthyroidism, Diabetes mellitus, Obesity, Psoriasis, Leucoderma, Oligozoospermia, Dysmenorrhoea, Leucorrhoea, etc.

Rasayana Therapy (Rejuvenation Therapy)

Rasayana therapy that focuses on strengthening the body and mind. Rasayana therapies are both preventive and curative. Both healthy people and individuals with health issues can take Rasayana therapy. Rasayana is defined as a therapeutic measure that promotes longevity, prevents aging, provides positive health and mental faculties, increases memory, and imparts resistance and immunity against diseases (Lad, 2002).

Vajikaran Therapy (Aphrodisiac Treatment)

Vajikarana therapy improves the function of reproductive systems and vitalizes reproductive tissues increasing sperm count, strengthen sperm motility in men and making the eggs more viable for conception in women. This process improves not only the quality and longevity of individual life but also the health and vitality of his or her offspring (Lad, 2002; Founder and President of Indus-Valley Ayurvedic Centre, n.d).

Ksharasutra Therapy (Medicated caustic thread)

Ksharasutra therapy is a minimal invasive Ayurvedic para-surgical procedure & time tested Ayurvedic technique in the management of anorectal disorders (Lad, 2002).

Indications of Ksharasutra: Fistula in Ano, Haemorrhoids, Sentinel piles, Pilonidal sinus, Rectal & anal polyps, etc.

Jalauka Avacharana (Leech Therapy)

Jalauka Avacharana (Leech Application) is defined as a gentle method for the removal of Pitta Dosa vitiated blood in a sophisticated person (Jain et al., 2010).

Indications of Leech Therapy: Skin diseases like Psoriasis and Eczema, Varicose veins, Thrombosed piles, Diabetic ulcer, Chronic non-healing ulcer, Burger's disease, etc.

KriyaKalpa (Ocular Therapeutics)

Kriyakalpa is the main therapeutic process for Ophthalmology in Ayurveda. Locally applied medication reaches conjunctival sac, fornices, inner and outer canthus, nasal cavity and blood vessels and alleviates the disease both locally as well as systemically. Kriyakalpa comprises seven distinct procedures, namely Netra Pariseka, Aschyotana, Anjan, Netra Tarpan, Putapaka, Pindi, and Vidalaka (Lad, 2002).

Indications of Kriyakalpa: Chronic conjunctivitis, Uveitis, Glaucoma, Diabetic retinopathy, Central serous retinopathy (CSR), Refractive errors, Computer vision syndrome, Stye, Chalazion, etc.

Gynaecological Care

Ayurveda plays an important role in women's life to prevent the morbidities and help her in a journey towards better health. Awareness of Paricharyas (daily regimen) for Rajaswala (menstruating women), Garbhini (antenatal), Sutika (Postnatal) is vital for preventing various gynaecological diseases. *Uttarabasti* (per vaginal administration of medicated oil) is considered as an alternative to artificial reproductive techniques. *Garbhasamskara* (antenatal care) techniques and prenatal counseling for couples planning for healthy progeny through Ayurveda minimize the complications during and after delivery. Polycystic ovarian disease, psychosexual problems, menstrual irregularities are mostly treated through Ayurveda (Choudhury, 2023).

Kaumarabhritya (Paediatric Care)

Kaumarabhritya deals with the healthy upbringing of infants, purification of mother's milk, and also cure for diseases of infants caused by intake of vitiated breast milk or Balagraha (various infections). *Swarnaprasana* (Ayurvedic immunization) is helpful for Medhavardhana (improving intellect), Agnivardhana (promoting digestion and metabolism), Balavardhana (promoting immunity and physical strength), Ayushyam (Promoting longevity), Grahapaham (protection against infectious organisms) (Lad, 2002).

Immunity and Ayurveda

The Ayurveda places a larger emphasis on building the strength of mind and body to cope with various stress factors, including infections. In Ayurveda, several treatment options are available for enhancing immunity against diseases; these include certain immune-modulators known as Rasayana. Amla (*Phyllanthus emblica*), Guduchi/Giloya (*Tinospora cordifolia*), Aswagandha (*Withania somnifera*), Chyavanprash and Brahmarasayan are used as Rasayan and for preventing many infectious diseases. In Ayurvedic practice, the objective of immune enhancement is achieved through the use of the Rasayana and Vajikarana therapy. (Lad, 2002).

Cancer treatment in Ayurveda

In Ayurvedic concept, according to ‘Charaka Samhitas’ and ‘Sushruta Samhitas’ cancer is described as inflammatory or non-inflammatory swelling and mentioned either as ‘Granthi’ (minor neoplasm) or ‘Arbuda‘ (major neoplasm). The nervous system (Vata or air), the venous system (Pitta

or fire) and the arterial system (Kapha or water) are three basics of Ayurveda and very important for normal body function. In malignant tumors all three systems get out of control (Tridoshas) and lose mutual coordination that causes tissue damage, resulting critical condition. Tridoshas cause excessive metabolic crisis resulting in proliferation (Jain, 2010).

The modern cancer therapy which is known to burdened by drug-induced toxic side effects hoping perfect cure of disease form the complementary and alternative medicine system. The main goal of Ayurvedic therapy is to find the ultimate cause of an illness while the therapeutic approach of Ayurveda is divided into four categories as Prakritisthapani chikitsa (health maintenance), Rasayana chikitsa, (restoration of normal function), Roganashani chikitsa (disease cure) and Naishthiki chikitsa (spiritual approach). Commonly used herbal decoctions reported in Ayurveda are made of multiple herbs possessing great potential for a cancer cure; scientifically these formulations work on multiple biochemical pathways and influence different organ systems all together and nourish the body as a whole by supporting body‘s deference systems (Jain, 2010).

Branches of Ayurveda

Clinical medicine of Ayurveda was developed into eight distinct specialties, on the basis of which it is called ‘***Ashtang Ayurveda’*** (Ashtanga Hridaya, 2004)

1. **Kayachikitsa** (Internal Medicine)
2. **Shalya Tantra** (Surgery)
3. **Shalakya** (Eye and ENT)
4. **Kaumar Bhritya** (Pediatrics)
5. **Graha Chikitsa** (Psychiatry)
6. **Agad Tantra** (Toxicology)
7. **Rasayana** (Gerontology)
8. **Vajikarana** (Science of Virility)

Summary

- **Overview of Ayurveda**: Ayurveda is the ancient science of healing which was initially discovered in India over 5,000 years ago. Ayurveda deals with the body-mind-spirit's balance for the betterment of health and life. Ayurveda focuses on living in accord with nature and knowledge of one's constitution or doshas.

- **Concepts of Ayurveda**: Ayurveda is based on the three-dosha doctrine, of which there are three primary types-Vata, Pitta and Kapha. Doshas represent diverse aggregations of five basic elements in the body-ether, air, fire, water and earth. When doshas remain well-balanced, health persists; every kind of derangement precipitates disease.
- **Origins and Development of Ayurveda**: Ayurveda evolved from the ancient time in India and has been passed down through generations orally and through ancient texts like the Charaka Samhita and Sushruta Samhita. It has evolved over thousands of years with contributions from various scholars and practitioners.
- **Evolution and Spread of Ayurveda**: Ayurveda spread from India to other parts of the world, including Southeast Asia. It has influenced traditional medicine systems like Thai and Tibetan medicine. In recent years, Ayurveda has become popular worldwide as people look for alternative and holistic forms of medicine.
- **Principles of Ayurveda**: There are many such principles lying behind Ayurveda. Some of these are that every person is unique and requires different treatments; maintaining a balance in every activity of life; body, mind and spirit are interlinked; and natural elements should be utilized to promote health and to prevent diseases.
- **Diagnosis in Ayurveda**: The patient's diagnosis is made based on individual constitution (prakriti), current status of an imbalance in dosha levels and the imbalances involved in the body's system; it also considers techniques like the examination of pulses (Nadi pariksha), characteristics of appearance, and relevant questions regarding lifestyle activities and symptoms.
- **Treatments in Ayurveda**: The treatments under Ayurveda depend upon restoration of doshas and, hence, overall health and wellbeing. It may be in terms of diet and lifestyle modifications, herbal drugs, detoxifying therapies or panchakarma, yoga, meditation, or other holistic therapies as needed by the patient.

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CHAPTER 2

KEY AYURVEDIC HERBS AND THEIR INTERACTIONS

Amla *(Emblica officinalis)*

Overview

Amla (*Emblica officinalis* Gaertn. or *Phyllanthus emblica* Linn.), also known as or Indian gooseberry (family-Euphorbiaceae or Phyllanthaceae), holds significant value in traditional medicine, particularly Ayurveda and folklore. In Sanskrit, it is referred to as Amrit Phala, Amalaki, or Dhartiphala. Amla is mentioned in "Charak Samhita," a foundational text of Ayurvedic medicine, also native to India and Southeast Asia. Amla has long been utilized as both a medicinal remedy and a nutritional tonic due to its rich content of polyphenols, essential amino acids and vitamins. It is a particularly potent source of vitamin C and minerals, surpassing other citrus fruits. While all parts of the Amla plant have medicinal uses, its fruits are most commonly used in rasayana (rejuvenating treatments), either on their own or in combination with other herbs, to treat various infectious and non-infectious diseases (Variya et al., 2016; Kulkarni and Ghurghure, 2018).

Traditional Uses

Amla is used in Ayurveda as a rejuvenating agent because it balances the three doshas, namely Vata, Pitta and Kapha. It is often mixed with Baheda and Haritaki to make the known Ayurvedic medicine called Triphala. Amla is an integral part of the widely popular Ayurvedic formulation called Chyavanaprasha, and it is famously referred to as the "King of Rasayana" for its numerous health benefits. Amla is utilized in the traditional Indian medicine for the treatment of numerous disorders that include diabetes, cough, asthma, bronchitis, cephalalgia, eye disorders, dyspepsia, colic, bloating, hyperacidity, peptic ulcers, skin diseases, leprosy, haematogenesis, inflammation, anemia, emaciation, hepatopathy, jaundice, diarrhoea,

dysentery, hemorrhages, leucorrhoea, menorrhagia, cardiac disorders, intermittent fevers and premature greying of hair (as a hair tonic) (Variya et al., 2016; Kulkarni and Ghurghure, 2018).

Chemical Composition

Amla contains one of the highest concentrations of ascorbic acid (vitamin C), offering powerful antioxidant and immune-boosting effects. Amla also consists of high levels of polyphenols such as ellagic acid, gallic acid and chebulagic acid, along with various tannins (like emblicanin A and emblicanin B), minerals, vitamins, amino acids, alkaloids, fixed oils and flavonoids like rutin and quercetin (Variya et al., 2016; Kulkarni and Ghurghure, 2018).

Interactions

Amla's bioactive compounds can interact with certain medications, affecting their efficacy and safety.

- Amla has hypoglycemic properties that can lower blood sugar levels. When combined with antidiabetic medications such as insulin or metformin, the risk of hypoglycemia increases (Singh et al., 2011).
- Amla has been shown to blood thinning properties, which can impair the effectiveness of anticoagulants such as warfarin or aspirin, and can increase the risk of bleeding (Variya et al., 2016).
- Amla has a mild degree of hypotensive that may add to the effect antihypertensive, which may lead to hypotension (Dasaroju and Gottumukkala, 2014).
- Amla was reported to decrease cholesterol levels especially LDL cholesterol. When statins are combined with Amla, additive effects can be manifested and can lower cholesterol level more (Kulkarni and Ghurghure, 2018).

Side Effects

Amla is safe; however, there are cases in particular people, especially when administered in large quantities or accompanied by drugs. Some major adverse effects include the following.

- High intakes of Amla, due to its fiber content, may cause stomach aches, cramps or diarrhoea in some people. The susceptible to diges-

tive problems individuals should take Amla in moderation (Variya et al., 2016).

- Amla's astringent properties may lead to excessive dryness in those who are prone to dehydration or dry skin diseases. It may also lead to a dry mouth or increased thirst (Singh et al., 2011).
- Though relatively seldom, allergic reactions including rash, itching or respiratory difficulties have been reported by few to be sensitivities of some individuals to Amla, (Dasaroju and Gottumukkala, 2014).

Ashoka *(Saraca asoca)*

Overview

Ashoka *(Saraca asoca (Roxb.)* W.J. de Wilde), belonging to the Fabaceae family, is a plant with notable medicinal importance in traditional Indian medicine. It has been used for centuries, particularly in the treatment of gynecological issues and other health conditions. Commonly referred to as Asoka or Ashoka, this tree is native to India and parts of South Asia. The name "Ashoka" is derived from Sanskrit, meaning "without sorrow" or "one that brings no grief." It is a medium-sized evergreen and deciduous tree, recognized for its fragrant orange or red flowers and smooth, arching branches. Ashoka is a key ingredient in many Ayurvedic and herbal preparations, including well-known products such as Ashokarishta, Ashokaghrita, Askoka Pattai Menosan and Eve Care. The most therapeutically valuable parts of the plant are its bark, flowers and seeds, with the bark being the most commonly used in Ayurvedic medicine. However, the bark is often adulterated with similar-looking species such as Asopalav (*Polyalthia longifolia*), Kachnar (*Bauhinia variegate*) and Sakhua (*Shorea robusta*) due to its morphological resemblance (Borokar and Pansare, 2017; Santhosh Kumar et al., 2023).

Traditional Uses

Ashoka has been referenced in various classical Ayurvedic texts, including the Charaka Samhita and Susruta Samhita, for its wide range of medicinal applications. It is known for its analgesic properties and is a powerful astringent used for treating skin conditions. Ashoka is traditionally prescribed for ailments such as uterine disorders, high fever, snake bites, neurological issues, eye diseases and wounds. It is the preferred remedy for Raktapradara (dysfunctional uterine bleeding), with this use first mentioned by Vrundamadhava. Primarily, Ashoka has been used in traditional medicine to address female health problems such as leucorrhoea, menor-

rhagia and dysfunctional uterine bleeding. The bark is said to treat conditions like biliousness, dyspepsia, dysentery, colic, piles, ulcers and pimples. The leaves are known for their blood-purifying properties, and when combined with cumin seed juice, they are used to alleviate stomach aches. The flowers, when crushed in water, are used to treat hemorrhagic dysentery, while the dried flowers are used for managing diabetes. Additionally, Ashoka flowers are highly regarded as a uterine tonic and are also useful in treating biliousness and syphilis ((Nyeem et al., 2017; Borokar and Pansare, 2017).

Chemical Composition

Ashoka has been reported to contain phytoconstituents like flavoinoids, steroids, glycosides, saponins, tannins, carbohydrates, proteins. The bark of plant contain epicatechin, procyanidin p2, 11'-deoxyprocyanidin B, catechin, 24-methyl-cholesta-5-en-3p-ol, 24-ethycholesta-5, 22-dien-33-ol, leucopelargonidin-3-O-p-D glucoside, leucopelargonidin and leucocyanidin (Santhosh Kumar et al., 2023; Nyeem et al., 2017).

Interactions

- Ashoka contains flavonoids and tannins that may have blood-thinning properties, which could increase the risk of bleeding when used with anticoagulant drugs like warfarin, heparin or aspirin (Borokar and Pansare, 2017).
- Ashoka is known for its effects on female hormones, particularly in the management of menstrual disorders. This could potentially interfere with hormonal therapies such as birth control pills or hormone replacement therapy (HRT), either enhancing or diminishing their effects (Nyeem et al., 2017).
- Ashoka may have mild hypoglycemic properties, which could enhance the effects of antidiabetic medications and potentially lead to hypoglycaemia (Santhosh Kumar et al., 2023).

Side Effects

- Ashoka is generally considered safe when used in traditional doses, especially in Ayurvedic medicine.
- Some individuals may experience gastrointestinal upset, such as nausea, stomach cramps or diarrhoea, especially if Ashoka is taken in high doses.

- Allergic reactions such as rashes, itching or breathing difficulties may occur in sensitive individuals.
- Since Ashoka has been traditionally used for female reproductive health, prolonged use in men might lead to hormonal imbalances, such as lowering testosterone levels (Santhosh Kumar et al., 2023).

Ashwagandha *(Withania somnifera)*

Overview

Ashwagandha, also known by its scientific name *Withania somnifera* and commonly called Indian ginseng or Winter Cherry, is a small shrub belonging to the Solanaceae family. It has been mentioned in ancient Ayurvedic texts like the Charaka Samhita and Susruta Samhita. Revered in Ayurveda, ashwagandha is classified as an adaptogen, which means it helps the body cope with stress. The name "ashwagandha" is derived from Sanskrit, with "ashwa" meaning horse and "gandha" meaning smell, symbolizing the belief that it provides horse-like strength when consumed. Used for over 3000 years in Ayurvedic and traditional medicine, it is native to India but also cultivated in places like the Mediterranean, the Himalayas, Africa, the Canary Islands, Cape of Good Hope and Australia (Singh, Bhalla et al., 2011; Mikulska et al., 2023).

Traditional Uses

Ashwagandha has been traditionally used in Ayurvedic medicine since ancient times to strengthen the nervous system. Its adaptogenic properties and medicinal benefits are well-documented, earning it the title of "rasayana" in Ayurveda—a term that signifies substances believed to promote physical and mental well-being, rejuvenate the body and enhance longevity. The root of ashwagandha is considered to have multiple therapeutic properties, including being a tonic, aphrodisiac, narcotic, diuretic, anthelmintic, astringent, thermogenic and stimulant. It is commonly used to treat conditions such as childhood emaciation, debility in old age, rheumatism, imbalances in vata, leucoderma, constipation, insomnia, nervous disorders and goiter. When the root is crushed with water, the resulting paste can be applied to joints to reduce inflammation and is also used for carbuncles, ulcers and pain relief. Additionally, the root, when combined with other medicines, is prescribed for snake bites and scorpion stings. It also helps in leucorrhoea, boils, pimples, flatulent colic, worms and piles (Singh, Bhalla et al., 2011; Lopresti and Smith, 2021).

Chemical Composition

The major biochemical constituents of ashwagandha are steroidal alkaloids and lactones, a class of constituents collectively known as withanolides. However, more than 12 alkaloids, 40 withanolides and several sitoindosides (a withanolide containing a glucose molecule at carbon 27) have been isolated and identified from aerial parts, roots and berries of Withania species. Depending on the location of the raw material, it exhibits a diverse composition of chemical compounds. Ashwagandha also contains flavonoids, steroidal saponins (acyl group–sitoindoside VII and VIII), saponins, coumarins (scopoletin), sterols, chlorogenic acid, resins, lipids, carbohydrates and fatty acids (Mikulska et al., 2023).

Interactions

- Ashwagandha has sedative properties and may enhance the effects of sedative medications like benzodiazepines (e.g., lorazepam, diazepam), barbiturates or other CNS depressants. Caution is advised when combining Ashwagandha with sedative drugs as it could lead to excessive drowsiness, lethargy or impaired motor skills (Lopresti and Smith, 2021).
- Ashwagandha can stimulate thyroid hormone production, particularly increasing T4 (thyroxine) levels. This can interfere with medications used to treat hypothyroidism or hyperthyroidism, potentially leading to either an excessive or inadequate dosage (Singh, Bhalla et al., 2011).
- Ashwagandha boosts immune function, which may counteract the effects of immunosuppressive drugs like corticosteroids or medications used after organ transplants (e.g., cyclosporine) (Mikulska et al., 2023).
- Ashwagandha may lower blood pressure, and when combined with antihypertensive drugs (e.g., ACE inhibitors, beta-blockers), it could cause hypotension (Lopresti and Smith, 2021).
- Ashwagandha has hypoglycemic properties, which may lower blood glucose levels. When taken alongside antidiabetic drugs (e.g., insulin, metformin), this may lead to hypoglycaemia (Mikulska et al., 2023).

Side Effects

Ashwagandha is considered generally safe when taken in recommended-doses. However, some individuals may experience side effects, particularly if taken in large quantities or in combination with certain medications.

- High doses of Ashwagandha can lead to gastrointestinal issues such as nausea, vomiting, diarrhoea and abdominal discomfort.
- Although rare, some individuals may experience allergic reactions such as rashes, itching or difficulty breathing.
- Ashwagandha may affect hormone levels, particularly testosterone, and should be used with caution by individuals with hormone-sensitive conditions such as prostate cancer or hormone-sensitive breast cancer (Singh, Bhalla et al., 2011; Mikulska et al., 2023).

Baheda *(Terminalia bellirica)*

Overview

Baheda (*Terminalia bellirica* (Gaertn.) Roxb.) belongs to family Combretaceae, widely grows in Indian subcontinent, including Pakistan, Nepal, Bangladesh, Sri Lanka as well as South-East Asia. In India, it is popularly known as "Bahera" or "Baheda", it is also known as "Beleric Myrobalan" and "Bibhitaki" (Gupta et al., 2020; Kumar & Khurana, 2018).

Traditional Uses

Baheda is used as astringent, laxative, antipyretic and anthelmintic agent. Fruits are useful in the treatment of asthma, bronchitis, hepatitis, diarrhoea, piles, dyspepsia, eye diseases, hoarseness of voice and scorpion-sting and also used as hair tonic. Decoction of the green fruit is useful in the treatment of cough. Fruit pulp is used in dysenteric-diarrhoea, leprosy, piles and dropsy. Partially ripe fruit acts as purgative and fruit kernel is narcotic. Ripe fruits of Baheda are used as astringent in combination with chebulic myrobalan (*Terminalia chebula*) and amla (*Phyllanthus emblica)* as the famous Triphala drug of Ayurveda. It is defined as a "Tridoshic rasayana" in Ayurveda as it maintains the harmony of three fundamental bodily bio-elements or "Doshas" such as "Vata", "Pitta" and "Kapha". Triphala stimulates longevity and rejuvenation in individuals of all ages. "Triphala" also has restorative and revitalizing potential as its ingredients act on the immune system and exert positive response to the body against several infectious conditions. Triphala drug of Ayurveda are also useful in eye problems like cataract, glaucoma, progressive myopia and conjunctivitis (Jayesh et al., 2019; Gupta et al., 2020).

Chemical Composition

Phytochemical studies on Baheda extracts revealed the presence of broad range of bioactive constituents, such as phenolic compounds, flavonoids, tannins, terpenes and their glycoside derivatives. The fruit is a major source of tannin and pseudotannins, gallic acid and its esters, chebulic, chebulagic, chebulinic acids and non-chebulic acid, ellagitannins, corilagin, ellagic acid and its glycosides, triterpenes and triterpenoidal glycosides (Gupta et al., 2020; Kumar & Khurana, 2018).

Interactions

Although Baheda is generally considered safe when used in traditional doses, it may interact with certain medications due to its pharmacological effects.

- Baheda has been reported to lower blood glucose levels, and when taken with antidiabetic medications such as insulin or oral hypoglycemic agents (e.g., metformin), it may potentiate their effects and lead to hypoglycaemia (Gupta et al., 2020).
- Baheda contains tannins, which may have anticoagulant (blood-thinning) effects. When combined with anticoagulant drugs such as warfarin, heparin, or aspirin, there may be an increased risk of bleeding (Kumar & Khurana, 2018).
- Baheda has hepatoprotective (liver-protecting) properties, which could potentially enhance the effects of medications used to treat liver disorders. While this is beneficial, caution is advised to avoid possible additive effects or toxicity when combining Baheda with other liver medications (Jayesh et al., 2019).

Side Effects

While Baheda is generally considered safe, excessive or inappropriate use can lead to side effects.

- In some individuals, Baheda can cause mild gastrointestinal disturbances such as stomach discomfort, nausea or diarrhoea, especially when taken in high doses (Gupta et al., 2020).
- Rarely, allergic reactions such as skin rashes, itching or breathing difficulties may occur in sensitive individuals.

- Although Baheda has hepatoprotective properties, excessive or prolonged use, particularly in high doses, could potentially cause liver damage or toxicity (Jayesh et al., 2019).

Brahmi (*Bacopa monnieri*)

Overview

Brahmi (*Bacopa monnieri*) belongs to the family Scrophulariaciae and the plant part used is the leaf. It is a perennial, creeping herb found throughout the wet lands of Indian subcontinent, particularly northeast and southern regions. Brahmi is commonly used in the traditional system of Ayurveda for the treatment in improving memory and reducing anxiety. In Indian Ayurveda, Brahmi has been in use as "medhya-rasayana" where "medhya" (in Sanskrit) means intellect or cognition and "rasayana" stands for rejuvenation. Medhya rasayana is a medication that eases the impacts of mental stress and further enhances brainpower and cognitive function (Sendri & Bhandari, 2023; Ray et al., 2021).

Traditional Uses

Traditionally, it has been used as a nerve tonic to improve the memory revitalizing capacity, attentiveness, as well as to reduce anxiety. It has also been documented in ancient articles of Ayurveda including Charaka Samhita and Bhavprakash Var-Prakarana (16th century AD). Numerous Ayurvedic formulations recommended for cognitive decline consists of Brahmi as a primary component. Brahmi possesses high-value medicinal properties such as neuroprotection against dementia, amnesia, Parkinson's disease, schizophrenia, Alzheimer's disease and epileptic seizures (Sendri & Bhandari, 2023; Ray et al., 2021).

Chemical Composition

Brahmi contains spectrum of bioactive phytochemicals such as triterpenoid glycosides, cucurbitacins, sterols, phenylethanoids and alkaloids. The pharmacological effects of Brahmi are attributed to the presence of a number of biologically active compounds, including alkaloids like brahmine, nicotinine and herpestine; saponins like herasapononin; potassium salts and sterols. The compounds responsible for the memory-enhancing effects of Brahmi are attributed to triterpenoid saponins called bacosides (Ray et al., 2021).

Interactions

While Brahmi is well-regarded for its neuroprotective effects, it can interact with certain medications due to its ability to modulate neurotransmitter activity, lower blood pressure and alter cognitive functions (Sendri & Bhandari, 2023).

- Brahmi exerts a calming effect on the central nervous system (CNS) and can enhance the sedative effects of medications like benzodiazepines (e.g., lorazepam, diazepam) or antidepressants (e.g., SSRIs). This may lead to excessive drowsiness or sedation.
- Brahmi enhances cholinergic activity in the brain, which may interfere with anticholinergic drugs (e.g., atropine, scopolamine) that work by blocking acetylcholine activity. This could potentially diminish the efficacy of anticholinergic medications (Ray et al., 2021).
- Brahmi has been reported to stimulate thyroid hormone production, particularly T4. This may enhance or alter the effects of thyroid medications in individuals with hypothyroidism or hyperthyroidism.
- Brahmi has been traditionally used to manage epilepsy, but it can interact with antiepileptic medications by potentially lowering the seizure threshold.
- Brahmi may lower blood pressure and can potentiate the effects of antihypertensive drugs, leading to hypotension.

Side Effects

Although Brahmi is generally considered safe when used appropriately. It may cause side effects, particularly in high doses or when combined with certain medications.

- Some individuals may experience stomach cramps, nausea, or diarrhoea after consuming Brahmi, especially at higher doses (Sendri & Bhandari, 2023).
- Due to its calming effects on the CNS, Brahmi can cause drowsiness or fatigue in some users, particularly when taken in large amounts.
- Dry mouth is a less common but reported side effect of Brahmi. It may occur due to its effects on the autonomic nervous system.
- Brahmi may reduce heart rate in some individuals, particularly those with pre-existing heart conditions. This effect can be compounded in people taking medications that lower heart rate (Ray et al., 2021).