

Integrating Ayurveda into Clinical Practice

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Abstract

Ayurveda is a comprehensive system of natural health care that has been practiced for thousands of years. It emphasizes prevention and health promotion, and modern-day research is confirming its ability to manage chronic disorders. Ayurveda considers the development of consciousness essential for achieving optimal health; meditation is the technique for achieving this. Pranayama (Breathing exercises) balances the body's energy field and emotions. Daily and seasonal routines are recommended to keep the mind and body in tune with the functioning of the laws of nature. Treatment of disease is individualized and depends on the patient's physiological constitution. Diet and digestion, sleep, and life-enhancing behaviors are considered key areas for optimizing health. Spices, herbs, and special preparations known as Rasayanas are utilized for treatment. Rasayanas are used for rejuvenation, slowing of the aging process, and promotion of healthful longevity. Panchakarma is a purification process that eliminates toxins from the physiology. Practicing physicians who learn the fundamentals of Ayurveda and basic Ayurvedic treatment modalities will increase their knowledge of medicine and life. Incorporating Ayurveda into their clinical regimen will enhance favorable outcomes for their patients.

Keywords: Ayurveda, meditation, Pranayama, spices, herbs, Rasayanas, Panchakarma

Ayurveda is a comprehensive natural health care system that has been practiced for thousands of years in India.¹⁻³ It is strongly prevention-oriented and modern-day research is now confirming its effectiveness in treating chronic disorders.⁴⁻⁸ Practicing physicians who learn the fundamentals of Ayurveda and the basic treatment modalities of this holistic system of health care will increase their knowledge of medicine and life, and incorporating Ayurveda into their clinical regimen will enhance the treatment of their patients.

Introduction to Ayurveda

Ayurveda means ‘the science of lifespan.’^{7,9} Ayurveda is called a natural health care system, since it is based in the natural laws that govern the functioning of all aspects of life. As such, Ayurveda is a holistic system of health care that deals with the whole range of life, from its origin in the deepest level of human consciousness – pure consciousness – to its expressions in mind, body, behavior, and the environment.³ Ayurveda has an uninterrupted oral tradition of clinical knowledge predating the written texts. There is a theoretical framework that provides valuable insights into psychological and physiological functioning, and an extensive materia medica describing the therapeutic use of medicinal plants. Ayurveda has as a goal the creation of perfect health for the individual rather than simply the absence of disease. Only after a comprehensive description of the strategies of prevention do the Ayurvedic texts enter into the realm of modalities for treatment of disease.

The main contribution of Ayurveda is the reminder that the mind and consciousness exert a deep influence on our physiology. If priority is given to the development of consciousness, the physiology will have the greatest capability to resist disease by keeping aligned with the invincible forces of nature that created it. The technology for evolution of consciousness is meditation. A large body of research documents the effects of meditation and validates the many health benefits associated with it.¹⁰⁻²¹

There are many examples of how Ayurveda views health and disease in a holistic manner. Ayurveda sees problems of health as being an imbalance in a person’s individual physiological constitution. One’s constitution is called one’s *Prakriti*. If the *Prakriti* is out of balance, it creates *Vikriti*, the basis of disease. Ayurvedic physicians (*Vaidyas*) first look at their patients as whole human beings who are unique in their *Prakriti*. They then look at the *Vikriti*, or imbalance, that has occurred. *Vaidyas* then make recommendations for restoring balance in the physiology, including dietary recommendations, nutritional supplements, and behavioral adjustments.

Physiological Principles of Ayurveda

In the Vedic texts, the five fundamental categories of matter and energy responsible for material creation are called *panchamahabhutas*. They are known as *Akasha* (space), *Vayu* (air), *Tejas* (fire), *Apas* (water), and *Prithivi* (earth). They are created as a result of the self-interacting dynamics of pure consciousness. The combination of *panchamahabhutas* results in formation of the three *doshas* which are known as *Vata*, *Pitta*, and *Kapha*. The *doshas* are fundamental, irreducible metabolic principles that govern the functioning of the entire body as well as the entire universe. These *doshas* are the connection between the human body and the universe on the material level. The *doshas* result from the following combinations of *panchamahabhutas* and each *dosha* has its own unique qualities:

- Space and air – *Vata*
- Fire and water – *Pitta*
- Water and earth – *Kapha*

Vata represents motion and flow. It is at the basis of the activity of the locomotor system and controls such functions as expansion and contraction of the lungs and heart, and blood circulation. It controls intestinal peristalsis and elimination, activities of the nervous system, the

contractile process in muscle, the ionic transport across membranes (such as the sodium pump), cell division, and unwinding of DNA during the process of transcription or replication. Vata is of prime importance in all homeostatic mechanisms and it controls the other two doshas, Pitta and Kapha.

Pitta represents bodily functions concerned with heat and metabolism. It directs all metabolic and catabolic activities, biochemical reactions, and the process of energy exchange. It regulates digestion, functions of the exocrine glands and endocrine hormones, and intracellular metabolic pathways such as glycolysis, the tricarboxylic acid cycle, and the respiratory chain.

Kapha represents structure and cohesion of the organism. It is responsible for biological strength, natural tissue resistance, and proper body structure. Microscopically, it is related to anatomical connections in the cell such as the intracellular matrix, cell membrane, membranes of organelles, and synapses. On the level of biochemistry, it structures receptors and the various forms of chemical binding.

Ayurveda Perspective on Health

The human constitution is made up of the combination of consciousness and matter (Vata, Pitta, and Kapha). When the relationship of consciousness and matter is in balance, a state of total balance and perfect health is created. In Ayurveda, this state of health is known as *Swastha*, which means established in the Self, established in the wholeness of life. The definition of health in Ayurveda is as follows:

He/She whose doshas are in balance, whose appetite is good, whose dhatus [tissue transformations] are functioning normally, whose malas [sweat, urine, stool] are in balance, and whose body, mind and senses remain full of bliss, is called a healthy person. *Susruta Sutrasthana 15, 41²*

An individual may have a specific predominance of one or more doshas that is naturally correct for him or her. For balance in the physiology, these doshas need not be present in equal proportion. However, they need to be functioning in a balanced state of harmony with each other. The natural state of the doshas is called Prakriti (Table 1). When the doshas are out of balance, they create Vikriti, or imbalance, which results in disorder and disease (Table 2).

Vata predisposes toward diseases of the nervous system, pain syndrome, cardiovascular illness, rheumatic disorders, constipation, anxiety, worries, and fear. Pitta predisposes toward ulcers of the alimentary tract and chronic inflammatory skin diseases, and is responsible for anger, envy, and jealousy. Kapha predisposes toward diseases of the respiratory system, diseases of the kidneys, diabetes mellitus, obesity, hardening of the arteries, and tumors. It is responsible for feelings of attachment and grief. The doshas are affected differently by the types of food eaten, the season of the year, the time of day, and so on.

Table 1. Classic Characteristics of Vata, Pitta, and Kapha Prakriti

<u>VATA PRAKRITI</u>	
Light thinner build	Quick to grasp new information, also quick to forget
Performs activity quickly	Tendency toward worry
Tendency to dry skin	Tendency toward constipation
Aversion to cold weather	Tendency toward light and interrupted sleep
Irregular hunger and digestion	
<u>PITTA PRAKRITI</u>	
Moderate build	Tendency toward irritability and temper
Performs activity with medium speed	Enterprising and sharp in character
Aversion to hot weather	Prefers cold food and drink
Sharp hunger and digestion	Tendency toward reddish hair and complexion, moles and freckles
Cannot skip meals	Good speakers
Medium time to grasp new information	
Medium memory	
<u>KAPHA PRAKRITI</u>	
Solid heavier build	Slow to grasp new information, slow to forget
Greater strength and endurance	Slow to become excited or irritated
Slow, methodical in activity	Sleep is heavy and long
Oily, smooth skin	Hair is plentiful, tends to be darker in color
Slow digestion, mild hunger	
Tranquil, steady personality	

Table 2. The Three Doshas

DOSHA	EFFECT OF BALANCED DOSHA	EFFECT OF IMBALANCED DOSHA	FACTORS THAT AGGRAVATE DOSHA
VATA	Exhilaration Clear and alert mind Perfect functioning of bowels and urinary tract Proper formation of all bodily tissues Sound sleep Excellent vitality and immunity	Roughness of skin Weight loss Anxiety, worry Restlessness Constipation Decreased strength Arthritis Hypertension Rheumatic disorder Cardiac arrhythmia Insomnia Irritable bowel syndrome	Excessive exercise Wakefulness Falling, bone fractures Tuberculosis Suppression of natural urges Cold Fear or grief Agitation or anger Fasting Pungent, astringent, or bitter foods In USA: Late autumn and winter In India: Summer and Rainy season
PITTA	Lustrous complexion Contentment Perfect digestion Softness of body Perfectly balanced heat and thirst mechanisms Balanced intellect	Yellowish complexion Excessive body heat Insufficient sleep Weak digestion Inflammation Inflammatory bowel diseases Skin diseases Heartburn Peptic ulcer Anger	Anger Strong sunshine Burning sensations Fasting Sesame products, linseed Yogurt Wine, vinegar Pungent, sour, or salty foods USA: Summer and early autumn In India: Rainy season and autumn
KAPHA	Strength Normal joints Stability of mind Dignity Affectionate and forgiving nature Strong and properly proportioned body Courage Vitality	Pale complexion Coldness Laziness, dullness Excessive sleep Sinusitis Respiratory diseases, asthma Excessive weight gain Looseness of joints Depression	Sleeping during daytime Heavy food Sweet, sour, or salty foods Milk products Sugar In USA: Spring In India: Late winter and spring

Nadi Vigyan (Pulse Diagnosis)

The main diagnostic tool used in Ayurveda is called *Nadi Vigyan*, the science of pulse diagnosis. It bases its success on the fact that the human pulse is connected to the heart through the circulation of blood, and also to the nervous system through its connections to the nerves. The fluctuations of consciousness that are reflected in the mind and in the physical qualities of Vata, Pitta, and Kapha in the body are conveyed to the pulse. Thus, the Ayurvedic technique of Nadi Vigyan, or pulse diagnosis, gives comprehensive knowledge of the functioning of the entire physiology. The pulse is the true measure of the kind and location of imbalance in the physiology.

The Three Pillars of Health

According to Ayurveda, there are three major pillars of health. They are diet and digestion, sleep, and life-enhancing behaviors. These are essential for maintaining and optimizing health.

Diet

Ayurveda maintains that all approaches to health can be maximally effective only if appropriate dietary measures are instituted simultaneously to support the restoration of physiological balance. Ayurveda has no single diet that is purported to be suitable for all individuals and all situations. The prescription of diet is individualized, being based on the diagnosis of the individual's current dosha status and taking into account seasonal influences, the individual's age and digestive capacity, any disease or imbalance present, sources and purity of food, and other factors. The optimal diet is one that tends to restore the individual to a state of balance.

Digestion is of prime importance in maintaining health. The end product of truly healthy diet and digestion is said to produce significant amounts of *Ojas*. Ojas is said to be the most important biochemical substance mediating the influence of consciousness on the body. When present in abundance, Ojas gives strength, immunity, contentment, and good digestion. Inefficient digestion and metabolism, on the other hand, result in production of toxic material in the body called *Ama*, the buildup of which results in disease.

Proper dietary measures strengthen the digestive and metabolic fires known as *Agni* and eliminate impurities from the physiology (Table 3). Ayurveda describes thirteen types of *Agni* that function in different areas of the body to carry on metabolic activities. *Agni* converts the food in the body to help form the bodily tissues. It is well known that without the proper heat, food cannot be cooked. Similarly, inside the body *Agni* or heat is generated in various tissues to give rise to the necessary chemical secretions, metabolic reactions, and functional processes associated with optimal digestion.

Table 3. Five Easy Ways to Improve Digestion

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|---|
| <ul style="list-style-type: none">• Eat the main meal at midday• Sit down when eating• Eat in a settled, quiet atmosphere, without watching TV, reading, or doing business• Sit quietly for 5 or more minutes after eating• Don't eat again until the previous meal has been digested & you feel hungry (usually 3 or more hours) |
|---|

Another aspect of diet emphasized in Ayurveda is taste, which is a crucial key for analysis of food in relation to the physiology of the body. Ayurveda describes six tastes: sweet, sour, salty, pungent, bitter, and astringent (Table 4). The taste of food is related to the food's properties. Food contains packets of intelligence analyzed by taste. Ayurveda recommends that all six tastes be represented in each meal. Taste affects the doshas, so the proper combination or proportion of

tastes in the food eaten is essential for balance in the physiology (Table 5).

Ayurveda also categorizes food according to six major food qualities: heavy, light, oily, dry, hot, and cold (Table 6). Food qualities affect the doshas, so the proper combination is needed to maintain balance in the physiology (Table 7). Which tastes and food qualities should predominate in the diet depends on the dosha status of the individual. In general, Ayurveda recommends including lots of fruits and vegetables in the daily diet. These foods contain phytochemicals (plant chemicals) that have an abundance of health-promoting properties. Polyphenols and bioflavonoids are phytochemicals that are powerful antioxidants. They have anticarcinogenic effects, protect against heart disease, and increase immunity.²²

Table 4. The Six Tastes and Some Common Examples

Sweet:	Sugar, Milk, Butter, Rice, Breads
Sour:	Yogurt, Lemon, Cheese
Salty:	Salt
Pungent:	Spicy foods, Peppers, Ginger, Cumin
Bitter:	Spinach, Other green leafy vegetables
Astringent:	Beans, Pomegranate

Table 5. How the Tastes Affect the Doshas

<u>Decrease Vata</u>	<u>Increase Vata</u>
Sweet	Pungent
Sour	Bitter
Salty	Astringent
<u>Decrease Pitta</u>	<u>Increase Pitta</u>
Sweet	Pungent
Bitter	Sour
Astringent	Salty
<u>Decrease Kapha</u>	<u>Increase Kapha</u>
Pungent	Sweet
Bitter	Sour
Astringent	Salty

Table 6. The Six Major Food Qualities and Some Common Examples

Heavy:	Cheese, Yogurt, Wheat products
Light:	Barley, Corn, Spinach, Apples
Oily:	Dairy products, Fatty foods, Oils
Dry:	Barley, Corn, Potatoes, Beans
Hot:	Hot (temperature) foods and drinks
Cold:	Cold foods and drinks

Table 7. How the Major Food Qualities Affect the Doshas

<u>Decrease Vata</u>	<u>Increase Vata</u>
Heavy	Light
Oily	Dry
Hot	Cold
<u>Decrease Pitta</u>	<u>Increase Pitta</u>
Cold	Hot
Heavy	Light
Oily	Dry
<u>Decrease Kapha</u>	<u>Increase Kapha</u>
Light	Heavy
Dry	Oily
Hot	Cold

Sleep

The quality of sleep is very important to one's health for both physical and psychologic reasons. Deep sleep is rejuvenating to the body, and health-promoting biochemicals are manufactured during this time. Interleukin-2 is a cytokine that assists the immune system in destroying cancer cells. Melatonin is a hormone that helps bring on sleep, fights free radicals, and increases levels of cytokines such as Interleukin-2. These are two of the many beneficial biochemicals the body produces during sleep.²³

Ayurveda recommends going to bed by 10:00pm because a purification process occurs in the body between the hours of 10:00pm and 2:00am. Pitta is active at this time and works to digest any intermediate metabolites in the physiology and break down toxic wastes. If one stays awake during this time, the purification process will not be carried out effectively. In addition, hunger will set in and eating more food at this late hour will overload the system and result in more toxic wastes being produced.

Life-Enhancing Behaviors

Behavior, speech, and emotions are important aspects of the human psyche that affect health in a dramatic way. Ayurveda includes detailed discussions of lifestyle and behavior and their impact on health. Interestingly, traditional virtues such as respect for elders, teachers, loved ones, and family members; pardoning those who wrong you; practicing nonviolence; not speaking ill of others behind their back and so on, are understood to promote health for the individual's mind and body, as well as for the community and society as a whole.

The input from the five senses – hearing, sight, touch, taste, and smell – creates changes in the physiology and each experience is metabolized in its own way. When food is digested, assimilated, absorbed, and metabolized, the byproduct of metabolism affects our physiology. Similarly, information from the different senses is metabolized and affects our behavior. Therefore, it is important to experience health-promoting input through each of the five senses. According to Ayurveda one should avoid overuse of the senses, no use of the senses, and improper use of the senses; this balance in sensory input helps maintain balance in the physiology.

Emotions can be understood as fine fluctuations of consciousness; as such, their impact on the more expressed physical levels of the body is understood to be immense. Ayurveda has various modalities to keep the emotions balanced; meditation and *Pranayama* (Breathing exercises) are two of the major ones. Meditation keeps us in touch with the source of our existence, which has a balancing effect on all aspects of our Being. *Pranayama* activates *Prana*, the vital energy in the body, thus balancing the body's energy field and the emotions.

Biological Rhythms

Daily rhythms and seasonal rhythms affect our psyche and physiology. *Dinacharya* is the section of Ayurveda that addresses daily routine. Different doshas are predominant during different hours of the day and night (Table 8) and this factors into the recommendations for daily routine. For example, the main meal of the day should be eaten around noon since Pitta is predominant at this time and digestion will be strongest. The evening meal should be light. One should go to bed by 10:00pm because Kapha is predominant from 6:00pm to 10:00pm. Kapha is associated with qualities of heaviness so this is naturally a time when drowsiness sets in and sleep will come more easily. One should arise in the morning by sunrise since Vata is predominant during this time. Vata is associated with movement and lightness and getting out of bed at this time will facilitate feeling energetic and refreshed. Kapha is predominant from 6:00am to 10:00am so arising during this time will create a feeling of heaviness and lethargy. Ayurveda has recommendations for a daily routine that helps maintain balance in the physiology (Table 9). Adjusting one's behavior to a health-promoting daily routine puts the mind and body in tune with the functioning of the laws of nature. By promoting behavior in accord with natural law, the integrity of key biological rhythms is maintained.

Ritucharya is the section of Ayurveda that covers seasonal routines. The seasons are classified according to the doshas (Table 8). Changes in the seasons create fundamental shifts in our biochemistry and metabolic style. Variations in sunlight, heat, cold, wind, and moisture are metabolized by the body. These variations in nature are mirrored by variations in the human physiology. This is seen in the predominance and manifestation of diseases due to Vata, Pitta, and Kapha during their respective seasons. For example, in the United States colds and respiratory problems are predominant in the springtime. This is Kapha season, and Kapha predisposes toward diseases of the respiratory system.

In contrast to the U.S., the Indian subcontinent has six seasons: Spring, Summer, Rainy season, Autumn, Early winter, and Late winter. Vata accumulates during Summer and is vitiated during the Rainy season. Pitta accumulates during the Rainy season and is vitiated during Autumn. Kapha accumulates during Late winter and is vitiated during Spring. The various changes in the weather affect the physiology accordingly.

When one season changes into another season there is an accumulation of doshas. At this time the likelihood of aggravation of the doshas, resulting in disease, is more likely. If one is able to adapt at this time, health will be maintained; otherwise, disease may develop. Ayurveda has lifestyle recommendations that keep the body in tune with the dosha variations of the different seasons. For example, Kapha accumulates in the springtime and since this dosha is associated with qualities of heaviness, physical exercise is suggested and daytime sleep should be avoided. In summer Pitta accumulates; this dosha is associated with qualities of heat, so exposure to the sun should be avoided, physical overexertion should be avoided, and light clothing should be worn. In winter Vata accumulates; this dosha is associated with qualities of coldness and dryness, so recommendations include oil massage, exposure to the sun, and heavy, warm clothing.

The different doshas are predominant during different periods of the life cycle (Table 8). Kapha predominates during childhood, Pitta during adulthood, and Vata during old age. The individual's Prakriti and Vikriti must be taken into consideration in specific instances.

Table 8. The Times of Day, Seasons, and Life Cycle Classified According to the Doshas

<p>Kapha time: Approx. 6am (sunrise) to 10am and 6pm to 10pm Kapha season: In USA, Spring; In India, Late winter and spring Kapha period in life cycle: Childhood (this must be tempered by consideration of the individual's Prakriti and Vikriti)</p> <p>Pitta time: Approx. 10am to 2pm and 10pm to 2am Pitta season: In USA, Summer and early autumn; In India, Rainy season and autumn Pitta period in life cycle: Adulthood (see qualification under Kapha, above)</p> <p>Vata time: Approx. 2pm to 6pm and 2am to 6am (sunrise) Vata season: In USA, Late autumn and winter; In India, Summer and Rainy season Vata period in life cycle: Old age (see qualification under Kapha, above)</p>
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Table 9. Ayurveda Daily Routine for Perfect Balance

Morning	<p>Wake up with the sun (from 5:30am to 6:30am) Evacuate bowels and bladder Brush teeth Clean tongue with a tongue scraper Gargle with sesame oil Shave and trim nails Give yourself an Ayurvedic warm oil massage Bathe or shower Practice Meditation program, including Yoga postures and Pranayama (Breathing exercises) Eat a light breakfast (optional) Work or study</p>
Noon	Eat the main meal of the day
Afternoon	<p>Work or study Practice Meditation program, including Yoga postures and Pranayama (Breathing exercises)</p>
Evening	<p>Eat a light supper, the earlier the better Take a brief 10-minute walk Listen to music / Visit with friends / Enjoy other relaxing activities Go to sleep before 10:00pm</p>

Panchakarma: Purification Therapy

Ayurveda recommends purification therapy at the change of seasons due to the accumulation of doshas that occurs at that time. This therapy is known as *Panchakarma* and it rids the body of toxins to prevent the onset of disease. Various modifications of this procedure are in vogue today. Traditionally, Panchakarma includes two preliminary practices that begin the toxin removal process, five main techniques that complete toxin removal from the body, and follow-up practices for rejuvenation and maintenance of the benefits provided by Panchakarma.^{24,25}

The two preliminary practices are *Snehana* and *Swedana*. *Snehana* involves external and internal oleation of the body, and *Swedana* is heat therapy. There are five main techniques and additional therapies are available. The modalities utilized depend on the constitution of the patient and any disturbances in the physiology. Panchakarma also includes specialized procedures for various disorders.

Follow-up practices are required to maximize and sustain the healthful benefits of

Panchakarma; these include herbal preparations and guidelines for everyday regimens. Research has shown that Panchakarma decreases blood levels of fat-soluble toxins such as polychlorinated biphenyls and agrochemicals by about 50%.²⁶ It also reduces risk factors for heart disease.²⁷

Ayurvedic Pharmacology (Dravyaguna)

Ayurvedic pharmacology (known as *Dravyaguna*) utilizes the synergistic cooperation of substances as they coexist in natural sources. It uses single plants, or more often, mixtures of plants whose effects are complementary.²⁸⁻³³ In terms of Ayurveda, the effectiveness of herbal mixtures may ultimately be explained by the idea that plants, especially herbs, are concentrated repositories of nature's intelligence which, when used properly, can increase the expression of that intelligence in the body. Special preparations known as *Rasayanas* promote longevity, stamina, immunity, and overall well-being.^{5,6} Common spices used in cooking also have therapeutic properties.

Spices

There are various spices that have significant therapeutic value and these can be used on a daily basis in preparing healthy meals. Turmeric (*Curcuma longa* Linn.) has been extensively researched and shown to have a broad range of beneficial properties. It is anti-inflammatory,³⁴ hepatoprotective,³⁵ antibacterial,³⁶ antifungal,³⁷ and enhances wound healing.³⁸ It protects against heart disease in several ways: it is antithrombotic;³⁹ it decreases triglyceride and low-density lipoprotein (LDL) levels;⁴⁰ and it prevents lipid peroxidation and aortic fatty streak formation.⁴¹ Turmeric has anticancer properties: it stimulates detoxifying enzymes, modulates transcription factors, and protects the DNA.⁴²⁻⁴⁸ Turmeric may protect against Alzheimer's disease; in laboratory experiments it protected cells from β -amyloid injury^{49,50} and in animal models it improved several aspects of Alzheimer's disease.^{51,52}

Research has shown that cinnamon is effective in the treatment of diabetes. *Cinnamomum zeylanicum* Blume lowers plasma glucose, glycosylated hemoglobin, triglycerides, and total cholesterol. It increases plasma insulin and high-density lipoprotein (HDL).⁵³ *Cinnamomum cassia* auct. reduces serum glucose, total cholesterol, LDL, and triglycerides in patients with type 2 diabetes.⁵⁴ Aqueous cinnamon extract lowered the fasting plasma glucose level in patients with poor glycemic control of type 2 diabetes.⁵⁵ In healthy subjects, cinnamon in rice pudding lowered the postprandial blood glucose level.⁵⁶ Cinnamon is also antioxidant,^{57,58} antimicrobial,⁵⁹ and promotes wound healing.⁶⁰

Cumin (*Cuminum cyminum* Linn.) has antidiabetic properties: it lowers blood sugar, glycosylated hemoglobin, triglycerides, free fatty acids, plasma cholesterol, and tissue cholesterol. In an animal model cumin was more effective in treating diabetes than the drug glibenclamide.⁶¹ Cumin is also hepatoprotective,⁶² antibacterial,⁶³ and improves irritable bowel syndrome.⁶⁴

Coriander (*Coriandrum sativum* Linn.) has traditionally been used as a treatment for diabetes. It has antihyperglycemic, insulin-releasing, and insulin-like activity.⁶⁵ Coriander protects against heart disease: it decreases total cholesterol, LDL, triglycerides, and lipid peroxide levels; and it increases HDL and the activity of antioxidant enzymes.^{66,67} Coriander also has antimicrobial activity.⁶⁸

Research on ginger (*Zingiber officinale* Rosc.) indicates it may be beneficial in preventing and treating heart disease: it reduces lipids, lipid peroxide, and atherosclerotic lesions; and it increases glutathione peroxidase.⁶⁹ Ginger has anti-inflammatory effects⁷⁰ and anticancer properties.⁷¹ It protects cells from β -amyloid injury which indicates it may protect against Alzheimer's disease.^{72,73} Ginger is also antifungal,⁷⁴ antiemetic, and anxiolytic.⁷⁵

Garlic (*Allium sativum* Linn.) has been heavily researched and found to have various

beneficial effects. It is anti-inflammatory,⁷⁶ immunomodulatory,⁷⁷ anticancer,⁷⁸ antihypertensive,⁷⁹ and antimicrobial.⁸⁰ It mitigates thyroxine-induced hyperglycemia⁸¹ and may be helpful in halting the progression of Alzheimer's disease.⁸² It protects against heart disease in several ways: it has antiplatelet activity; it reduces triglycerides and total serum cholesterol; and it increases HDL.⁸³ In clinical trials, garlic stopped the progression of arteriosclerotic plaque volume and in some cases regressed it.⁸⁴

Herbs

The herbs and herbal mixtures used in Ayurveda are prepared from various parts of the plant, i.e. leaves, root, bark, fruits, seeds, etc. The use of combinations of herbs provides synergistic effects while mitigating any toxic side effects.⁴ For this reason Ayurveda does not recommend using isolated active ingredients from any herb – beneficial synergistic effects are lost and toxicity can occur.⁸⁵ Ayurveda has an extensive materia medica, with ancient texts describing more than 700 herbs in detail.⁸⁶ Research has been conducted on Ayurvedic herbs for the past 100 years.⁴⁻⁸ Ashwagandha (*Withania somnifera* Dunal) is a prominent herb used in Ayurveda as a general tonic for increasing energy and improving overall health and longevity. It is also used for treating a variety of disorders, including arthritis and menstrual disorders. Ashwagandha has been heavily researched and found to have a wide range of beneficial properties. It is antioxidant, anti-inflammatory, immunomodulatory, adaptogenic, anticancer, antistress, and has positive effects on the cardiovascular, endocrine, and central nervous systems.^{4-6,8,87,88} Its anticancer properties include enhancing immunity, inducing apoptosis and cell cycle arrest, and inhibiting angiogenesis and metastasis. Inhibition of the transcription factor known as nuclear factor kappa B (NF-κB) has been identified as a mechanism of action in Ashwagandha's ability to induce apoptosis and inhibit angiogenesis. Ashwagandha also sensitizes tumors to radiation and anti-cancer drugs while protecting normal cells.^{89,90}

Neem (*Azadirachta indica* A. Juss.) is a well-researched Ayurvedic herb that has traditionally been used to treat a wide array of disorders. It is antifungal, antiviral, antimalarial, antibacterial, antifertility, immune-enhancing, antioxidant, anti-inflammatory, anticancer, antihypertensive, antihyperglycemic, antipyretic, antiulcerogenic, antipsoriasis, diuretic, analgesic, and hepatoprotective.⁹¹⁻⁹³ Clinical studies on Neem showed it has significant hypoglycemic activity in patients with Type 2 diabetes⁹⁴ and is very effective in treating gastroduodenal ulcers and controlling gastric hypersecretion.⁹⁵

Rasayanas

Rejuvenation therapy, known as *Rasayana* in Ayurveda, deals with prevention or delay of the aging process, thereby promoting healthful longevity. Behavioral Rasayanas include certain behaviors said to increase health and well-being. Herbal Rasayanas are preparations that promote vitality and stamina and stimulate overall health. They are purported to activate tissue repair mechanisms, increase resistance to disease, and arrest or reverse the deterioration associated with aging. Rasayanas achieve these effects by maintaining balance in the three doshas – Vata, Pitta, and Kapha.^{3-6,8,9,28-33}

Conclusion

Ayurveda is a natural, comprehensive system of health care that has thousands of years of clinical experience. It is now being validated by modern research methodologies. Practicing physicians who learn the fundamentals of Ayurveda and basic Ayurvedic treatment modalities will increase their knowledge of life, and integrating Ayurvedic technologies into their clinical armamentarium will enhance favorable outcomes for their patients.

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