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A Discussion on the Therapeutic Importance of Medicinal Herbs and Benefits of Proteins Incorporated in XanthPro by Renatus

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Abstract

Protein is one of the building blocks of bone, muscle, and skin. The body needs it to produce hormones, enzymes, and other chemicals. Eating protein-rich foods and taking supplements may help people feel fuller for longer. Feeling full tends to result in smaller portion sizes and less frequent snacking, which can help a person maintain a healthy weight. Due to a hectic lifestyle and poor eating habits, many of us may be lacking the required protein in our everyday diet. Renatus XanthPro is a unique protein supplement formulated with highly essential Vitamins & Minerals to give your body a fulfilling nutritional boost. The primary ingredient of this protein powder is Mangosteen (*Garcinia mangostana*)- a rich source of one of the rarest and most beneficial antioxidant families known as Xanthones. Xanthones have a broad spectrum of therapeutic properties such as- anti-oxidant, anti-tumor, anti-allergic, anti-inflammatory, anti-bacterial, anti-fungal and anti-viral activities. It is a low-fat composition that helps in weight management. It also contains prebiotic fibre and probiotics that enhance digestion and aid in faster absorption. It protects the body from free radical damage while boosting the energy levels and recovery. It also helps to maintain a healthy blood sugar level and increase the count of white Blood Cells (WBCs) in the blood. It is enriched with immunity-enhancing herbs that make it a better choice for complete wellness. These herbs are of ancient origin and are researched till date to extract more valuable properties in order to enhance human well-being. This review addresses the therapeutic importance of five such medicinal herbs which are an important composition of Xanthpro Protein powder. The inscribed herbs are Licorice (*Glycyrrhiza glabra*), Ashwagandha (*Withania somnifera*), Shatavari (*Asparagus racemosus*), Aloe-Vera (*Aloe barbadensis miller*) and Gotu Kola (*Centella asiatica*). Pharmacological experiments have demonstrated that different extracts and pure compounds from these species exhibit a broad range of biological properties. Therefore, the use of these herbal supplements in XanthPro, makes the protein powder to be used more reliably and widely. Overall, it gives our body nourishment as well as protection. It is not just a protein supplement, but is a volutionary step towards a healthy nation.

Keywords: Protein, Renatus XanthPro, Mangosteen, Xanthones, Therapeutic, Immunity-enhancing herbs, Pharmacological, Soy Protein Isolate, Pea Protein Isolate.

Introduction

In recent times, there is a rise in use of plant extracts in modern medicine. The search for effective, efficient, safe and economical alternatives have led to a rise in use of natural phytochemicals derived from plants in treating diseases of the human body. A large body of evidence exists to substantiate the use of herbs for preventing and treating human diseases.

Licorice is the root and stolon of the *Glycyrrhiza* plant, which belongs to the family Leguminosae. The licorice plant is an important medicinal herb, and the constituent—glycyrrhizin—is widely used as a natural sweetener and also as a pharmaceutical agent because of its anti-inflammatory and hepatoprotective properties. Furthermore, licorice extracts are used as cosmetics, food additives, tobacco flavors, and confectionery foods. In this article, we review the importance of licorice and its related products (Hayashi and Sudo, 2009).

Withania somnifera belongs to the Solanaceae family, commonly known as Ashwagandha, Indian ginseng or Winter cherry. It is an important commercial medicinal crop, considered as similar to Panax ginseng in Chinese medicine. Different parts of this plant are used in traditional medicine for the treatment of various ailments. It provides defense against diseases, adverse environmental factors and helps to retard the aging process. Ashwagandha exhibits a wide range of therapeutic properties by tuning the endocrine, cardiopulmonary, central nervous system and sexual behavior without any toxicity (John, 2014).

Asparagus racemosus (Shatavari), belongs to the family Asparagaceae. It is an adaptable plant as well. The adaptation of human body to mental and physical stress is said to be achieved by the help of adaptogenic herbs like these. Shatavari is an ayurvedic medicine staple that is made available in the form of analeptic for the wellbeing and vitality of person. It is popular among all therapeutic plants due to various active biochemicals present in it. Shatavari extracts from its different parts like roots, flowers, leaves and stems are effective in treating female organs which are involved in reproduction (Kurdukar and Jogdand, 2021).

The Aloe Vera plant has been known and used for centuries for its health, medicinal and skin care properties. Aloe Vera belongs to the family Xanthorrhoeaceae. Aloe Vera gel contains a large range of vitamins even vitamin B12, Vitamin A, Vitamin C, Vitamin E and folic acid. Aloe Vera gel contains

important ingredients including fatty acids and sugars. The Aloe Vera as the "Wonder plant" is multiple from being an antiseptic, anti-microbial, anti-ulcer, anti-inflammatory agent, helps in relieving like tumor and diabetes. It is known to help slow down the appearance of wrinkles and actively repair the damaged skin cells that cause the visible signs of aging. It is attributed to its minimal side effects, highly effective treatment (Minwuyelet *et al.,* 2017).

C. asiatica belongs to the genus *Centella* in the family of Apiaceae which comprises about 50 species including the most abundant species *Centella asiatica* (L.) Urban syn. *Hydrocotile asiatica* Linn. *C. asiatica* is a plant well valued for its use in cuisine as well as in medicine and has been in use since prehistoric time. Its culinary use is closely woven with its well-known health benefits in traditional societies. *C. asiatica* is considered as an ethnomedicinal plant widely used in diverse ancient cultures as medicine in traditional medicinal systems such as Ayurveda and Unani as well as in folk remedies (Sabaragamuwa *et al.,* 2018).

Soy Protein:

The nutritional value of processed soy protein (isolated soy proteins and soy-protein concentrates) in human protein and amino acid nutrition is evaluated on various scientific grounds via study of growth and nitrogen balance in infants, children, adolescents and adults. Findings show that well-processed soy-protein isolates and soy-protein concentrates can serve as the major, or even sole, source of protein intake and that their protein value is essentially equivalent to that of food proteins of animal origin. Soy proteins have also been found to be of good quality to include in hypocaloric diets for weight reduction in obese subjects (Young, 1991).

Soy proteins as an important food ingredient have been widely applied in food formulations, due to their good nutritional value, high functionalities, and health-benefiting effects. Soy proteins are a kind of excellent building materials to be fabricated into a variety of nanostructured delivery systems for food bioactive ingredients (Tang, 2019).

Soy protein is one of the increasingly important food proteins in human diets, and has been recognized to be nutritional, functional and even health-benefiting. In 1999, the US Food and Drug Administration (FDA) approved labeling for foods containing soy protein as protective against coronary heart disease (FDA, 1999) (Girgih *et al.,* 2015). Besides the outstanding cholesterol-lowering effects, soy protein also shows anticarcinogenic effects, protective effects against obesity, diabetes and kidney diseases (Rafieian-Kopaei *et al.,* 2017).

Most protein powders are derived from either the milk proteins- casein and whey, egg protein, or the extracted soy protein. Soy protein is particularly well suited for vegetarians and vegans. Soy contains lower amounts of "branched chain amino acids" (BCAAs) than cow milk as well. BCAAs refer to a trio of Essential Amino Acids considered key when it comes to maintaining muscle: leucine, isoleucine, and valine. In theory, proteins with a higher branched-chain amino acid content will lead to greater Mononuclear Phagocyte System (MPS) (Kronberg *et al.,* 2020).

Soy protein is an important composition of the Protein Supplement Renatus XanthPro. The ability of soy to stimulate muscle protein synthesis both at rest and in response to a single bout of lower-body resistance training was greater than the dairy protein casein. Soy foods and Soy Protein supplements can be viewed as a source of protein suitable for building strength and increase metabolism (Borack *et al.,* 2016).

Pea Protein:

The common pea (*Pisum sativum* L.), including field pea and garden pea, is one of the oldest domesticated crops, cultivated for either human foods or livestock feeds. As one of the most important leguminous crops, field pea is grown in 84 different countries and constitutes the largest percentage (36%) of total pulse production over the world (Dahl, Foster, and Tyler, 2012).

Field pea is known as a primary source of nutritional components and can be fractionized into various ingredients and foods products enriched in protein, starch, fiber, etc. (Rubio *et al.,* 2014). In general, pea seeds contain 20–25% protein, 40–50% starch and 10–20% fiber (Tulbek *et al.,* 2016).

Pea protein is a relatively new type of plant proteins and has been used as a functional ingredient in global food industry. Pea protein includes four major classes (globulin, albumin, prolamin, and glutelin), in which globulin and albumin are major storage proteins in pea seeds. Globulin is soluble in salt solutions and can be further classified into legumin and vicilin. Albumin is soluble in water and regarded as metabolic and enzymatic proteins with cytosolic functions. The composition and structure of pea protein, as well as the processing conditions, significantly affect its physical and chemical properties, such as hydration, rheological characteristics, and surface characteristics (Lu *et al.,* 2020).

It is used as nutritional supplement for sports and exercises. Leucine, isoleucine and valine are three essential branched-chain amino acids (BCAAs) which have an aliphatic side chain with a branch and can promote muscle growth. Pea protein is an excellent source of BCAAs and has high and balanced contents of leucine, isoleucine and valine (Shimomura *et al.,* 2004).

Because of these properties of muscle building and metabolism boosting, pea proteins are used in the commonly consumed protein powder- Renatus XanthPro. The supplementation with pea protein promotes a greater increase of muscle thickness as compared to Placebo and especially for people starting or returning to a muscular strengthening. Vegetable pea proteins could be used as an alternative to Whey-based dietary products. With its availability, low cost, nutritional values and health benefits, pea protein can be used as a novel and effective alternative to substitute for animal proteins in functional food applications (Babault *et al.,* 2015).

Role of Probiotics and Prebiotics:

Probiotics and prebiotics share a unique role in human nutrition, largely centering on manipulation of populations or activities of the bacteria that colonize our bodies. Benefits of regular consumption of probiotics or prebiotics include enhanced immune function, improved colonic integrity, decreased incidence and duration of intestinal infections, down-regulated allergic response, and improved digestion and elimination. Research has shown that probiotics and prebiotics may be useful in achieving these and other positive effects, provided that proper strain, product selection, and dosing guidelines of commercial products are followed (Douglas and Sanders, 2008).

The term "Probiotics" was first introduced by Vergin, when he was studying the detrimental effects of antibiotics and other microbial substances, on the gut microbial population. He observed that "probiotika" was favourable to the gut microflora. Probiotic were then redefined by Lilly and Stillwell as "A product produced by one microorganism stimulating the growth of another microorganism". The latest definition put forward by FDA and WHO jointly is "Live microorganisms

which when administered in adequate amounts confer a health benefit to the host" (Pandey *et al.,* 2015).

Prebiotics are mostly fibers that are non-digestible food ingredients and beneficially affect the host's health by selectively stimulating the growth and/or activity of some genera of microorganisms in the colon, generally lactobacilli and bifidobacteria (DeVrese and Schrezenmeir 2008). An ideal prebiotic should be 1) Resistant to the actions of acids in the stomach, bile salts and other hydrolyzing enzymes in the intestine 2) Should not be absorbed in the upper gastrointestinal tract. 3) Be easily fermentable by the beneficial intestinal microflora. FAO/WHO defines prebiotics as a non-viable food component that confer health benefit(s) on the host associated with modulation of the microbiota. (Kuo 2013).

Foods fortified with probiotic bacteria confer beneficial effects on human health and are categorized as functional foods. The salubrious activities of probiotics include the synthesis of vital bioactives, prevention of inflammatory diseases, anticancerous, hypocholesterolemic, and antidiarrheal effects (Abbasi *et al.,* 2022). Soy foods are exemplary delivery vehicles for probiotics and prebiotics and there are diverse strategies to enhance their functionality like employing mixed culture fermentation, engineering probiotics, and incorporating prebiotics in fermented soy foods. High potential is ascribed to the concurrent use of probiotics and prebiotics in one product, termed as "synbiotics," which implicates synergy, in which a prebiotic ingredient particularly favors the growth and activity of a probiotic micro-organism. The insights on emended bioactive profile, metabolic role, and potential health benefits of advanced soy-based probiotic and synbiotic hold a promise which can be profitably implemented to meet consumer needs (Sasi *et al.,* 2022).

Because of these beneficial properties of Probiotics, they are incorporated in the protein supplements. They help to increase the appearance of amino acid in the blood when taken with the protein sources or supplements. It supports the absorption of Essential Amino Acids (EAAs) which is needed to build muscles when we exercise or workout. They generally help with the digestion of protein and carbohydrates through the action of digestive enzymes such as alkaline proteases, etc. It also aids in muscle recovery through Gut modulation. Studies have revealed that Probiotics have beneficial effect on the muscle damage, muscle performance and recovery after a muscle damaging exercise bout (Wang *et al.,* 2022).

Therapeutic Importance of Licorice

Licorice is a very well-known herb in traditional Chinese medicine (TCM). In China, it is called "gancao" (meaning "sweet grass") and has been recorded in the *Shennong's Classic of Materia Medica* around 2100 BC (Wang *et al.,* 2015). There are 29 species and 6 varieties of *Glycyrrhiza* in the world. These are distributed from the Mediterranean Sea to the temperate zone of Asia, but are mainly in the dry and semi-dry areas of the cold temperate zone and warm temperate zone of the Northern Hemisphere, and more concentrated in the central and eastern Asia. A few species are distributed in North America, western South America and southeastern Australia (Na *et al.,* 2021).

Glycyrrhiza glabra Linn. is one of the most extensively used medicinal herb from the ancient medical history of Ayurveda. It is also used as a flavoring herb. The word Glycyrrhiza is derived from the Greek term glykos (meaning sweet) and rhiza (meaning root). *Glycyrrhiza glabra Linn*, commonly known as 'liquorice' and 'sweet wood' belongs to Leguminosae family. Vernacular names for liquorice are Jeshthamadh (Marathi), Jothi-madh (Hindi), Yashtimadhu, Madhuka (Sanskrit), Jashtimadhu, Jaishbomodhu (Bengali), Atimadhuram, Yashtimadhukam (Telugu), Jethimadhu (Gujarati) and Atimadhuram (Tamil) (Damle, 2014).

Innumerable plants have been used widely as integral medicinal sources since the start of human civilization. The demand for herbal medicines is constantly increasing with time overtime. Licorice **(***Glycyrrhiza glabra* family Leguminosae) is one of the most used herbal plants in foods, in medicinal forms, and substantially researched on a worldwide scale. It was used as traditional and complementary medicine against innumerable ailments including allergies, liver toxicity, gastric ulcer, lung diseases, skin disorders, oral health problems including tooth decay, and inflammation. The constituents of licorice include various essential oils, sugars, inorganic salts, resins, amino acids, and nucleic acids. Biological activity has been observed to be portrayed by active compounds of licorice including triterpene, flavonoids, and saponins. In recent years, licorice has been widely researched to discover its benefits, constituents, and its mechanism of action (Noreen, 2021).

In Persian traditional literature, licorice root is reported as a nerve tonic and neuroprotective agent, and its preparations are recommended for some neurologic disorders like headache (Aghili, 2009). Moreover, in Persian ethnomedicine, licorice preparations (infusion, macerate and/or hydrosol) are used as a neuroprotective herbal remedy in order to prevent disabilities caused by stroke or Parkinson's disease. In a clinical trial has been earlier reported that, the beneficial effects of licorice extract were observed in patients experienced stroke (Ravanfar *et al.,* 2016). Glycyrrhizin (GLH) occurs freely in commonly ingested foods and the supplements are recommended for the treatment of several debilitating diseases such as diabetes, cancer, and cardiovascular complications (Sabiu and Idowu, 2022).

Free radicals are produced by the normal response of cells during aerobic respiration and perform various functions, such as signaling and providing protection against infection. However, excessive free radicals can lead to aging, cancer, and other diseases. The antioxidant can overcome the harm caused by excessive free radicals. The molecular mechanism of scavenging oxygen free radicals of Licorice Green Tea Beverage (LGTB) through network pharmacology and molecular docking, and its efficacy was verified by free radical scavenging experiment in vitro, HaCaT cell oxidative stress injury induced by H_2O_2, D-galactose to establish an aging model in mice and Western blotting experiment. It not only elucidates its mechanism at the system level, but also proves its validity at the biological level (Hu *et al.,* 2022).

GLR (Glycyrrhizic Acid) has shown activities against different viruses, including SARS-associated Human and animal coronaviruses. GLR is a non-hemolytic saponin and a potent immuno-active anti-inflammatory agent which displays both cytoplasmic and membrane effects. At the membrane level, GLR induces cholesterol-dependent disorganization of lipid rafts which are important for the entry of coronavirus into cells. At the intracellular and circulating levels, GLR can trap the high mobility group box 1 protein and thus blocks the alarming functions of HMGB1. The membrane and cytoplasmic effects of GLR, coupled with its long-established medical use as a relatively safe drug, makes GLR a good candidate to be tested against the SARS-CoV-2 coronavirus, alone and in combination with other drugs (Bailly and Vergoten, 2020).

Licorice extracts flavonoids and triterpenoids isolated from licorice possess great antidiabetic activities *in vivo* and *in vitro.* This was done by several mechanisms such as increasing the appetency and sensitivity of insulin receptor site to insulin, enhancing the use of glucose in different tissues and organs,

clearing away the free radicals and resist peroxidation, correcting the metabolic disorder of lipid and protein, and improving microcirculation in the body (Yang *et al.,* 2020).

The pharmacological effects of licorice include adrenocortical hormone-like effects, anti-inflammatory, antibacterial, antiviral, and antitumor effects. It has effects on the digestive system and cardiovascular system. It also has antioxidative and anti-allergenic properties, improves the auditory function of the inner ear, and reduces cerebral ischemia. It is used in modern clinics for the treatment of gastric and duodenal ulcers, bronchitis, pharyngitis, chronic hepatitis and other diseases. Licorice has a wide range of applications in other industries outside of medicine. For example, licorice and its extracts are often used as functional sweeteners in food and beverages, and licorice extracts are also employed to enhance the flavor of tobacco products. Its industrial applications include cosmetics, soaps, and oral health products, as well as environmental applications related to ecosystem management (Ding *et al.,* 2022).

Licorice is widely used as a "medicine food homology" herbal medicine, so it is very important to systematically evaluate the safety of licorice. Based on TCM (Traditional Chinese Medicine) theory, as the saying that "all drugs are slightly toxic", although licorice is regarded as a kind of natural, safe and effective edible-medicine, but its dosage and duration should also be paid attention (Jiang *et al.,* 2020).

Therapeutic Importance of Ashwagandha

Withania somnifera (Ashwagandha) is a popular Ayurvedic herb, commonly known as "Indian winter cherry." The root smells like a horse ("Ashwa") and the species name somnifera means "sleep-inducing" in Latin, indicating its sedating properties (Bhat *et al.,* 2015).

Ashwagandha is the most ancient and sought-after herb used for the preparation of herbal formulations and nutraceuticals for the treatment and prevention of various diseases including infectious diseases, nervous and sexual disorders, cancer, diabetes, inflammation-related disorders, ulcer, stress, immunological disorders, and arthritis. It is used as a tonic to rejuvenate the body, delay aging process, and boost defense against infectious disorders and promote longevity (Gwaltney, 2021).

As Ashwagandha root extract contains a wide array of nutrients and phytochemicals, it is used as a dietary supplement and for health restoration (Chauhan and Mehla, 2015). *Withania somnifera* root powder has a shielding effect on bone collagen. The aqueous extract produced a significant reduction of pain, stiffness, and disability in patients with knee joint inflammation in a random, double-blind, placebo study (Shaheen and Alsenosy, 2019).

Therapeutic effects of *Withania somnifera* on the reproductive system reported that the plant improved the reproductive system function in many ways. Its extract decreased infertility among male subjects, due to the enhancement in semen quality which is proposed due to the enhanced enzymatic activity in seminal plasma and decreasing oxidative stress, while it improved luteinizing hormone and follicular stimulating hormone balance leading to folliculogenesis and increased gonadal weight, in some animal studies (Nasimi *et al.,* 2018).

Doxorubicin, a member of the anthracyclin drug family is one of the most frequently used drugs in the treatment of leukaemia, lymphoma and solid tumors in adults as well as an essential treatment for childhood solid tumors and aggressive lymphomas and acute lymphoblastic or myeloblastic leukaemia. The use of the drug-induced cardiotoxicity affected the immune functions. This toxic side effect creates a problem during cancer chemotherapy causing myelosuppression, mucosal ulceration, alopecia, and diarrhoea, etc. Therapeutic impact of Ashwagandha for bettering the toxic side effects being produced during doxorubicin administration was impactful and greatly useful (Rizvi *et al.,* 2016).

The roots are used as a nutrient and health restorative in pregnant women and old people while the decoction of the root boiled with milk and ghee is suggested for curing sterility in women. The roots are used in the treatment of constipation, rheumatism, senile debility, general debility, loss of memory, nervous exhaustion, loss of muscular energy and spermatorrhoea. In the Unani system, the roots of Withania somnifera, known as Aswagandha are used for various medicinal purposes. The leaves of the plant are also reported to have been used medicinally (Alam *et al.,* 2016).

The major active phytoconsituents of *Withania somnifera* root extract are highly oxygenated withanolides (Srivastava *et al.,* 2019). These compounds possess various pharmacological activities such as immunomodulation, antioxidant, neuroprotective, anticancer, antibacterial, antiepileptic, spermatogenic, adaptogenic, antidepressant, antianxiety, anti-inflammatory, hepatoprotective, hypolipidemic, antiarthritic, antimicrobial, hypoglycaemic, aphrodisiac, radiosensitizing, antiulcer, antioxidant, etc. (Trivedi *et al.,* 2017). Besides withanolides and alkaloids, the Ashwagandha root also contains reducing sugars, starch, peroxidases, dilcitol, glycosides, 2-phenyl ethanol, withanicil, benzoic acid phenylacetic acid, benzyl alcohol, and 3,4,5-trihydroxy cinnamic acid (Mandlik and Namdeo, 2021).

The importance of *Withania somnifera* in the healing world has been recognized due to the maximum build up and varied forms of withanolide. All the identified variants of withanolides became fascinating for researchers due to their advantageous effects for the human body (Hassannia *et al.,* 2020).

One of the serious forms of cancer that severely affects female population is ovarian cancer (OVCA). There was a study conducted on the changes that occur in the NK cell (Natural Killer Cells) migration during the development of OVCA. Study also aimed to screen the immune-boosting activity of *Withania somnifera* extracts in mobilizing, localizing the NK cells which further combat against ovarian cancer cells (Barua *et al.,* 2013).

W. somnifera has revealed the capability to decrease reactive oxygen species and inflammation, modulation of mitochondrial function, apoptosis regulation and improve endothelial function. Withaferin-A is an important phytoconstituents of *W. somnifera* belonging to the category of withanolides been used in the traditional system of medicine for the treatment of various disorders (Mandlik and Namdeo, 2021).

Cognitive decline is often associated with the aging process. Ashwagandha (*Withania somnifera* (L.) *Dunal*) has long been used in the traditional Ayurvedic system of medicine to enhance memory and improve cognition. Ashwagandha may be effective in enhancing both immediate and general memory in people with MCI as well as improving executive function, attention, and information processing speed (Choudhary *et al.,* 2017).

Ashwagandha is a proven medicinal plant in Ayurveda formulation whose dried powder, crude extract, as well as purified metabolites of the plant, have shown promising therapeutic properties. The products available at the industrial level developed based on *Withania somnifera* plant and its medicinally important parts are creams, oil formulations,

ointments, tablets, powders, sprayers etc. (Lakshmi and Sekhar, 2018).

Therapeutic Importance of Shatavari

Shatavari, *Asparagus racemosus* is one of the most important herbal drugs used by Ayurvedic Vaidyas since ancient days. The drug is having wide range of therapeutic activity and mentioned as a Rasayan by ancient Ayurvedic texts. The main part used by Ayurvedic doctors is a root. It is mentioned as a tonic and having lactogenic function. Shatavari has also been successfully used by several Ayurvedic practitioners for Nervine disorders, Acid peptic diseases, certain infectious diseases and as a immunomodulant. Main use of this drug is in female disorders specially as a galactagogue and several menstrual disorders. Scientific fraternity is working on this drug at multidimensional level to prove this drug as a potent medicinal drug in multiple disorders (Bhokardankar *et al.,* 2019).

Asparagus racemosus a well-known female tonic species, a well-known home-grown herb in India, that belong to the Asparagus genus of the Asparagaceae family. The *Asparagus racemosus* roots, stems, flowers and leaves are employed in herbal therapy, and also used as a food and nutraceutical supplement. Pharmacological and therapeutic research, phytochemistry of the *Asparagus racemosus* and its active components are widely studied and researched (Parihar and Sharma, 2021).

Asparagus racemosus, a climbing Ayurvedic plant, is known for its numerous activities such as hyperlipidemia, hypertension, angina, dysmenorrhea, anxiety disorders, benign prostatic hyperplasia (BPH), leucorrhoea and urinary tract infections. This plant possesses a wide range of secondary metabolites inclusive of steroids, alkaloids, dihydrophenanthrene derivatives, flavonoids, furan derivatives and essential oils. Information from the literatures suggest that the major constituents of *A. racemosus* are steroidal saponins which are mainly responsible for different biological activities of *A. racemosus* (Singla and Jaitak, 2014).

Asparagus racemosus is mainly known for its phytoestrogenic properties. With an increasing realization that hormone replacement therapy with synthetic oestrogens is neither as safe nor as effective as previously envisaged, the interest in plant-derived oestrogens has increased tremendously making *Asparagus racemosus* particularly important. The plant has been shown to aid in the treatment of neurodegenerative disorders and in alcohol abstinence-induced withdrawal symptoms. Besides use in the treatment of diarrhoea and dysentery, the plant also has potent antioxidant, immunostimulant, anti-dyspepsia and antitussive effects (Bopana and Saxena, 2007).

Ethanolic root extract of *Asparagus racemosus* Linn. (EEAR) shows relevant antioxidant property. The study provides experimental support for the traditional medicinal plants. Along with antioxidant property of this plant, HPTLC fingerprint data of root extract of EEAR can be used as diagnostic tool for the correct identification of the plant and also useful to estimate genetic variability in their population. Based on the toxicity study to ensure therapeutic efficacy and quality control of the drug along with its identification, EEAR was found to be non-toxic at a dose of 2000 mg/kg (Karuna *et al.,* 2018).

Shatavari aqueous extract may have valuable applications in immunochemical industry to obtain more efficient and sustained immunostimulation resulting in increased yields of immune sera production and to improve immunogenecity of weak and or low dose antigens. Further studies on pharmacodynamics including antibody profiles, cytokine induction and regulation of immune response in terms of Th1 and Th2 needs to be undertaken to explore therapeutic and industrial importance (Gautam *et al.,* 2004).

In the current scenario of ageing population and increased environmental factors, the more prevalent eye disease is 'Dry Eye Syndrome'. It is a tear film disorder caused by tear deficiency or excessive tears evaporation which results in ocular surface damage and there by irritation, discomfort and dimness of vision. According to Ayurveda, studies have been carried out to evaluate the role of Shatavari Ghrita Netratarpana in the management of dry eye syndrome (Swamy, 2012).

The root extract appeared to have a defensive impact in the memory cell carcinoma. Steroidal segments of the *A. racemosus* were researched for the apoptotic action and surmised to have the ability to tumour cell death. Shatavarin IV possess' significant anti-cancer properties (Mitra *et al.,* 2012). From the various experiment Shatavarin IV shows the most extreme potential to diminish cell viability and mortality rate (Joshi, 2016).

The plant shows the property of adaptogen (improve the capacity of body to changes as indicated by the climate). As referred before, it is rasayana spice to improve the cell resistance (Forinash *et al.,* 2012). The root extract of Shatvari provide significant protection against fungal infections such as candida, *Malassezia furfur* and *M. globosa* (Onlom *et al.,* 2014).

The ethyl acetate extract of the roots of *A. racemosus* has been tested for antiplasmodia activity (Kaushik *et al.,* 2013). *A. racemosus* root powder at the quantity of 200mg/kg can reduce the tissue weight, inflammatory cytokine production, neutrophil mediated myeloperoxidase action, so it is consisting anti-inflammatory property (Gyawali and Kim, 2012).

It is recommended by the World health organization (WHO) the most of the world's population depends on herbal medicine for their health care. Shatavari, *Asparagus racemosus* is one of the most significant restorative plant employed by Ayurvedic Vaidyas from ancient times. Much scientific research on *Asparagus racemosus* has been conducted over the last years to investigate chemical and pharmacological properties. The phytochemicals of the plant are widely distributed with many therapeutical properties. The main therapeutic use of the plant Shatavari is on the reproductive system of women and promotes learning and memory (Thakur *et al.,* 2021).

Therapeutic use of Aloe-Vera

Aloe vera (*Aloe barbadensis* Miller, family Xanthorrhoeaceae) is a perennial green herb with bright yellow tubular flowers. *Aloe vera* derives from "Allaeh" (Arabic word that means "shining bitter substances") and "Vera" (Latin word that means "true"). The colorless mucilaginous gel from *Aloe vera* leaves has been extensively used with pharmacological and cosmetic applications (Maan *et al.,* 2018).

Among various species of *Aloe*, *Aloe vera* is considered to be the most potent, commercially important and the most popular plant in the research field. Various parts of the plant contain approximately 75 nutrients, as well as 200 active compounds including amino acids, sugars, enzymes, vitamins, minerals, saponins, anthraquinones, lignin and salicylic acid. Volatile components and ascorbic acid are present in the flowers while polysaccharides, lignin, pectin, hemicellulose and cellulose are present in the rind. Similarly, the leaves are the source of various organic acids, enzymes, phenolic compounds, minerals and vitamins (Ali *et al.,* 2012).

Aloe vera, a succulent perennial and drought resisting plant, is well known for its therapeutic potential. Beneficial effects of *Aloe vera* have been reported, including immunomodulatory, wound and burn healing, hypoglycemic, anticancer, gastro-protective, antifungal, and anti-inflammatory properties. These beneficial therapeutic properties of *Aloe vera* have been employed for a number of commercial applications (Nazir *et al.,* 2018).

The Aloe plant is employed as a dietary supplement in a variety of foods and as an ingredient in cosmetic products. The widespread human exposure and its potential toxic and carcinogenic activities raise safety concerns. Chemical analysis reveals that the Aloe plant contains various polysaccharides and phenolic chemicals, notably anthraquinones. Ingestion of Aloe preparations is associated with diarrhea, hypokalemia, pseudomelanosis coli, kidney failure, as well as phototoxicity and hypersensitive reactions. Recently, *Aloe vera* whole leaf extract showed clear evidence of carcinogenic activity in rats, and was classified by the International Agency for Research on Cancer as a possible human carcinogen (Group 2B) (Guo and Mei, 2016).

Most recent studies on anti-inflammatory activity of *Aloe vera* are focused on the action mechanism of isolated compounds in murine macrophage RAW264.7 cells and mice stimulated with Lipopolysaccharides. Hence, the potential anti-inflammatory effect of aloin is related to its ability to inhibit cytokines, ROS (Reactive Oxygen Species) production, and JAK1-STAT1/3 signaling pathway (Ma *et al.,* 2018; Jiang *et al.,* 2018). Moreover, aloe-emodin sulfates/glucuronides (0.5 μM), rhein sulfates/glucuronides (1.0 μM), aloe-emodin (0.1 μM), and rhein (0.3 μM) inhibited pro-inflammatory cytokines and nitric oxide production, iNOS expression, and MAPKs phosphorylation (Li *et al.,* 2017).

Aloe vera crude extracts (40%, 50%, and 60% for 6, 24, and 48 h) reduced cell viability of cancer cell lines (human breast MCF-7 and cervical HeLa) through apoptosis induction (chromatin condensation and fragmentation and apoptotic bodies appearance in sub-G0/G1 phases) and modulation of effector genes expression (an increase in cyclin D1, CYP1A1, and CYP1A2 expression and a decrease in p21 and box expression) (Hussain *et al.,* 2015). Moreover, the isolated compound aloe-emodin has resulted to be an effective anticancer agent against both MCF-7 cells and HeLa cells by inducing mitochondrial and endoplasmic reticulum apoptosis and inhibiting metastasis oxidative stress (Luo *et al.,* 2014; Chen *et al.,* 2016; Tseng *et al.,* 2017; Trybus *et al.,* 2018).

Diabetes is a chronic disease presenting with high levels of glucose in blood because of an insulin resistance or an insulin deficiency. Studies on the effect of *Aloe vera* in diabetes and related complications have been investigated mainly in animal models induced by streptozotocin. Consistent evidence supports that oxidative stress is a main cause of the beginning and the progression of diabetes complications such as nephropathies and neuropathies. Hence, using this experimental model, *Aloe vera* showed to reduce blood glucose levels, to increase insulin levels, and to improve pancreatic islets (number, volume, area, and diameter) (Noor *et al.,* 2017), and this medicinal plant protected from oxidative stress-induced diabetic nephropathy and anxiety/depression-like behaviors (Arora *et al.,* 2019).

Antioxidants are compounds that prevent or slow down biomolecule oxidative damage caused by ROS through free radical scavenging, metal chelation, and enzyme regulation (Wang and Brumaghim, 2011). Scientists investigated the potential antioxidant activity of crude methanolic extracts of *Aloe vera* from six agro-climatic zones of India using different in vitro methods (i.e., DPPH, metal chelating, and reducing power assay) (Kumar *et al.,* 2017).

In vivo models of ischemia-reperfusion injury are commonly employed to evaluate the cardioprotective activity of *Aloe vera*. *Aloe vera* administered with gastric gavage previous to abdominal aorta and spinal cord ischemia increased antioxidant enzymes activity and reduced lipid peroxidation level, edema, hemorrhage, and inflammatory cell migration in Wistar albino rats (Yuksel *et al.,* 2016; Sahin *et al.,* 2017).

Different studies have been carried out to evaluate the antimicrobial activity of *Aloe vera* and its main constituents. Most of these studies are in vitro and focus on the antibacterial activity. One of the most studied bacteria are *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Hence, *Aloe vera* aqueous extract reduced growth and biofilm formation against methicillin resistant *Staphylococcus aureus* (Saddiq and Ghamdi, 2018). Moreover, this bacterium has also been inhibited by *Aloe vera* gel (50% and 100% concentrations), along with other oral pathogens obtained from patients with periapical and periodontal abscess including *Actinobacillus actinomycetemcomitans*, *Clostridium bacilli*, and *Streptococcus mutans* using disc diffusion, micro-dilution, and agar dilution methods (Jain *et al.,* 2016).

Aloe vera has also been investigated for treating reproductive health care problems. The results of these works carried out with experimental animals are contradictory (Erhabor and Idu, 2017; Behmanesh, 2018).

Aloe vera processed gel prevented of ovoalbumin-induced food allergy by exerting an anti-inflammatory action (histamine, mast cell protease-1, and IgE reduction) (Lee *et al.,* 2018).

The dose of 10 mg/kg of *Aloe vera* aqueous extract (3 times daily for a week) resulted to be the most effective in morphine withdrawal syndrome in morphine-dependent female rats as shown in agitation, disparity, and floppy eyelids reduction (Shahraki *et al.,* 2014).

Aloe vera has been traditionally used to treat skin injuries (burns, cuts, insect bites, and eczemas) and digestive problems because its anti-inflammatory, antimicrobial, and wound healing properties. Research on this medicinal plant has been aimed at validating traditional uses and deepening the mechanism of action, identifying the compounds responsible for these activities. The most investigated active compounds are aloe-emodin, aloin, aloesin, emodin, and acemannan. Likewise, new actions have been investigated for *Aloe vera* and its active compounds (Sholehvar *et al.,* 2016).

Therapeutic Use of Gotu Kola

Gotu Kola (*Centella asiatica L. Urban*) is a member of the Apiaceae Family, which is characterized by its constantly growing roots, and long copper-colored stolons (runners) with long internodes and roots at the base of each node. Also known as Indian Pennywort, it is a perennial creeping plant. It has been used as a therapeutic herb for thousands of years. Its ability to heal wounds, improve mental complications and to treat skin lesions are the main reasons for its wide spread use in different countries. The crop is becoming popular due to its ability to boost mental activity and improve circulation (Bandara *et al.,* 2011).

Centella asiatica is a nutritionally important plant and a valued traditional medicine in South East Asia. *C. asiatica* is one of the most commonly used green leafy vegetables (GLVs) due to its high amounts of medicinally important triterpenoids and beneficial carotenoids. It is used in the preparation of juice, drink, and other food products. It is also known to contain vitamins B and C, proteins, important minerals, and

some other phytonutrients such as flavonoids, volatile oils, tannins, and polyphenol (Chandrika, 2015).

In vitro and *in vivo* studies have shown important health benefits like antidiabetic, wound-healing, antimicrobial, memory-enhancing, antioxidant, and neuroprotective activities. However, detailed scientific approaches on clinical trials regarding health benefits and nutritional values of *C. asiatica* are limited, hindering the perception of its benefits, mechanisms, and toxicity in order to develop new drug prototypes. *In vitro* studies have shown that the method of processing *C. asiatica* has an impact on its nutritional values and health-related beneficial compounds (Kumara, 2015).

Stroke can cause cognitive decline. The frequency of cognitive impairment after an ischemic stroke range from 20 to 30%, with an increasing risk in the two years after stroke (Serrano, 2007). the effectiveness of Gotu kola (*Centella asiatica*) in improving cognitive function in patients with vascular cognitive impairment (VCI) is also being studied using a quasi-experimental design. Gotu kola is as effective as folic acid in improving poststroke VCI. Gotu kola has shown to be more effective than folic acid in improving memory domain. Studies have suggested that Gotu kola extract is effective in improving cognitive function after stroke (Farhana *et al.,* 2016).

Keloids are a type of scar, which is the result of overgrowth of dense fibrous tissue that usually develops after healing a skin injury. Keloids occur due to prolonged inflammatory phases in the wound, resulting in increased fibroblast activity and continuous extracellular matrix formation. Gotu kola (Centella asiatica) leaves are effective in the treatment of wounds because they contain Triterpene components such as asiatic acid, madecassic acid, asiaticoside and madecassoside. Gotu Kola leaf content play role in preventing keloid formation by increasing fibroblast proliferation, increasing collagen synthesis and mucopolysaccharide acids, increasing intracellular fibronectin which then significantly increases the tensile strength of newly formed skin, inhibiting the phases of the formation of skin, inflammation of the keloid scar tissue (Ago and Adifa, 2020).

Complementing its reputation in traditional medicine as a memory booster, *C. asiatica* possesses wholesome anti-oxidative properties to attenuate oxidative stress, a high anti-inflammatory potent, neuron regenerative ability, potential for neuron damage prevention, neurotoxicity inhibition effect, anti-anxiety and anti-depressive properties, AChE inhibitory potential and ability to reduce accumulation of amyloid plaques. These comprehensive multifunctional properties make it capable of promoting general neuroprotection as well as simultaneously targeting multiple disease pathways to arrest neurodegenerative disorders (Sabaragamuwa *et al.,* 2018).

C. asiatica is potential herb with an array of health-care applications. It is widely accepted that plant has got neuroprotective activities and helpful in brain improvement. Plants have proved to bear low toxicity and higher efficacy in clinical treatment with prominent activities such as anticancer, antibacterial, antifungal, anti-inflammation, neuroprotection, antioxidant, wound healing, and antidepressant. As *C. asiatica* is an endangered species using plant tissue culture mass propagation major can be helpful, and callus and suspension culture techniques can be harnessed for secondary metabolite extraction. Germplasm conservation could be a possible way to preserve this precious plant. Due to the presence of wide bioactive compound, the plant has vast application. The plant can be a safer alternative for the formulation of new drugs. Further research is needed to confirm their activities mentioned in ancient scripts followed by clinical studies for their safe application for humans (Prakash *et al.,* 2017).

Conclusion

Research on the above referenced medicinal plants has been aimed at validating traditional uses, deepening their mechanism of action and identifying the compounds responsible for the primary health care of living beings. Licorice is deemed emollient, expectorant, laxative, moderately pectoral and tonic. It should be used in moderation and should not be prescribed for pregnant women or people with high blood pressure, kidney disease or taking digoxin-based medication Since the outbreak of COVID-19, Glycyrrhizin, glycyrrhizin diamine and glycyrrhizin extracts have been widely studied and used in the trials. Ashwagandha is very reverbed herb of Indian Ayurvedic System and is used for various kinds of disease processes, especially as a nervine tonic. The roots, leaves and fruits possess tremendous medicinal value which makes it as a perfect rejuvenator of physical and psychological health. It is important to recognize that Ashwagandha may be effective not only in isolation but may actually have a potentiating effect when given in combination with other drugs or herbs. Shatavari found at low altitudes throughout India is a medicinal herb whose roots are used as a drug and are said to be tonic, diuretic and a galactagogue. It is widely used in infertility, cancer, depression, oedema bacterial or fungal infections, epilepsy, kidney disorders, chronic fevers, excessive heat, stomach ulcers and liver cancer, increases milk secretion in nursing mothers and regulates sexual behaviour. Aloe-Vera has been traditionally used to treat skin injuries and digestive problems. Latest in-vitro study revealed the protective action of this herb in bone diseases such as Osteoporesis. In-vitro studies on Gotu Kola revealed improvement in memory and cognition, stabilized diabetic symptoms and aid in topical wounds. Dose-dependent amounts of aqueous extracts of C. asiatica also decrease the appearance of ageing skin, collagen and topical scars. Scientists propose that Gotu Kola may be a leading candidate for aiding degenerative diseases with additional research. More of the therapeutic potential of these referred herbs, in term of their efficacy and versatility, are still in research. The growing number of herbal preparations in the market raised the possibility of complications related to improper use of these products, or the lack of medical supervision along with the likelihood of interactions with the drugs and herbs on simultaneous use. So, overall, it is important to provide patient counselling on the use of herbal preparations.

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