

Medicinal Plants in India and it's Antioxidant Potential – A Review

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Abstract

Health care is the primary concern in today's life. The current life style is also one of the major factors which contribute to many health hazards. Proper food, good sleep and regular physical activity are the remedial measures that has to be given utmost importance. Dietary practices followed in Indian foods are found to be natural precautions and cure for many diseases. When the significance of the medicinal herbs is brought to common people's notice, many diseases can be prevented easily with natural care without any adverse side effects. This paper presents a review of the significant medicinal plants and its role in natural therapy.

Key-words: Medicinal Plants, Natural Therapy, Indian Foods.

1. Introduction

In Recent days people go for fast food rather than healthy food. This paves the way for many health issues. Mostly, children are addicted to these kind of food products. Due to this people suffer with many sorts of diseases. This may also lead to cancer. Then, lack of physical activity also may affect the body and psychological problems may arise. These are the various reasons due to which people often get sick. In case of any health complications, many people think that consuming medicine is the remedy for illness. But there is enormous amount of healthy food present on earth

which are natural medicines. In this context, medicinal plants play a predominant role to lead a healthy life.

In India there are nearly 18,000 different species of flowering plants. Among these it is estimated that nearly 7000 plants have medical properties in those, 178 species have annual consumption levels more than 100 metric tons. These medicinal plants not only played an important role in traditional medicine but also provided health security livelihood to the greatest number of populations in India^[1] The traditional medicines of the system mainly focus on Rig-veda, Ayurveda, Siddha, Unanni, Naturopathy and Homoeopathy.^[2] The roots, shrubs, stems, leaves and seeds of every medicinal plant has countless medicinal values in it. These are used to cure many types of diseases.^[3] Indian forests are the depository of medicinal plants which has large collections of aromatic herbs, healthy raw materials, etc. Therefore, people in the worldwide depend on medicinal herbs due to its remedial purpose.^[4]

2. Medicinal Plants in India

More or less there are 70% of medicinal plants found in India. Most of the plants are situated in tropical forests of Himalayas.^[5] In Kashmir, plants are sited abundantly. Some of the herbs which are found in Kashmir are Hyoscyamusniger, Inularacemosa, Rheum emodi, Picrorhizakurroa.^[6] More number of species of the medicinal plants are situated in Uttaranchal, Sikkim and North Bengal.^[7] Numerous amounts of medicinal herbs are distributed in the Southern region of India^[8] There are about 52 effective medicinal herbs were found in Uthapuram area of Tamil Nadu. Some of the herbs are Pirandai, Kuppaimeni, Thandankeerai, Veliparuthi, Mudakathan.^[9] Each medicinal plant in West Godavari in Andhra Pradesh has high medicinal property and have unique feature in it and specifically these plants heal mortal diseases. Medicinal plants which have originated in this area are Acacia Arabica, Sapindusmukorossi, Tephrosiapurpurea, Withaniasomnifera, Ricinuscommunis.^[10]

3. Role of Medicinal Plants in Human Health

Medicinal plants play a vital role in sustaining the human health. Plants are being used in the medicines to maintain the health physically, mentally and socially. But people generally adapt the modern medicines to cure even simple health problems like cough, cold, fever, etc. These modern medicines gained popularity because they act fast on the health problems and show fast recovery. Whereas, green medicines or traditional medicines does not show immediate result towards the health

problem. Chemically prepared drugs or modern medicines can act quickly but they have side effects which affect human body, whereas medicinal plants work in an efficient way and it does not give any side effects.^[11]

In ancient time, mostly people depend on nature (plants) for their needs and even for treating and preventing from the diseases. From the past 3000 years, medicinal plants which are available in nature are used in health care. Nowadays in modern culture, medicinal plants play a very important role in protecting human health. The medicinal plants contain some compounds of therapeutic value. Therefore, they are used as drugs prevent from the diseases.^[12] Due to more availability, less cost and non-toxic medicines are used to cure diseases at greater extent. Medicinal herbs, they generally provide major source of molecules with some important and valuable medicinal properties and contains phytochemical constituents.^[13] Due to this these herbs are proved to be important in detecting and curing the diseases. Medicinal plants provided mankind, a large variety of drugs to eradicate and prevent the infections and suffering disorder.^[14] It plays a crucial role in protecting human health.

4. High Demand of Medicinal Plants in India

Our nation is found to be a medicinal garden of the world. Many indigenous systems such as Ayurveda, Yoga, Unani, Homeopathy, Naturopathy and Siddha are famous and prevailing in India from decades. According to All India trade survey of prioritized medicinal plants taken in 2019, demand of Medicinal plants increased by 50%. Medicinal trees take more than 10 years to get harvested. While others, take one year to harvested. Cultivation of medicinal plants is one of the profitable business for farmers in India. Farmers across the nation are getting financial assistance by the AYUSH Ministry to empower the cultivation of herbs and other medicinal plants. More than 95% of the 400-plant species used in preparing medicine by various industries are harvested from wild forests in India. Harvesting medicinal plants for commercial use, slow reproducing, slow growing and habitat specific species, are the crucial factors in meeting the goal of sustainability. Furthermore, rising demand with shrinking habitats may lead to the local extinction of many medicinal plant species. In India till now there are many number of medicinal plants whose antioxidants needed to be investigated in terms of their advantageous properties.

The following are some of the list of significant Indian Medicinal plants, their benefited the prominent functional groups responsible for their antioxidant properties in Table 1

Plants showing antioxidant properties due to phenolic groups			
Name of the plant	Chemical composition	Medicinal Benefits	Prominent functional groups responsible for antioxidant
 Ghritkumari	It contains three pentosides mainly barbaloin, isobarbaloin and beta barbaloin.	Prevents the dryness factor of mammalian skin. The gel obtained from the leaves is layered on the affected area for moisturizing.	OH, C-H and = CO bonds corresponding to phenolic groups are responsible for the antioxidant property. ^[15]
 Saracaasoca	This plant contains the presence of glycoside, flavonoids, tannins and saponins	It is used to cure disorder, uterine problems, menstruation pain and diabetes. The powder made from the seeds is used to heal bone fracture.	Presence of alkenes and carboxylic groups at 3421-3398 cm ⁻¹ and 1697 cm ⁻¹ . ^[16]
 Phyllanthus emblica	It contains Triacontanol, Triacontanoic acid, β-Amyrin ke-tone, Betulonic acid, Daucosterol, Lupeol acetate, β-Amyrin-3-palmitate, Gallic acid, Betulinic acid, Ursolic acid, Oleanolic acid, Quercetin and Rutin.	This is high in fiber and relief from the abdominal pain.	Presence of phenolic group corresponding to the FTIR band at 3402 cm ⁻¹ . ^[17]
 Justicia adhatoda	It contains phytochemicals such as alkaloids, tannins, saponins, phenolics and flavonoids.	It is a stimulant also used to cure bleeding disorders, asthma and cough. It is also used to cure tuberculosis.	IR band at 3411 cm ⁻¹ corresponding to the NH and -OH groups. ^[18]
 Kantakari	The chemical constituents are Carpesterol, gluco-alkaloid solanocarpine; solanine-S; solasodine, -solamargine, cycloartanol, cycloartenol, stigmasterol, campesterol, cholesterol, sitosteryl-glucoside, stigmasteryl- glucoside, solasurine, galactoside of sitosterol, methyl ester of 3,4- dihydroxycinnamic acid and 3,4- dihydroxycinnamic acid (caffeic acid), isochlorogenic, neochlorogenic, chlorogenic acids	This is anti inflammatory. It prevents from asthmatic attacks. Flowers of this plant is used to cure the burning sensation in the feet.	Presence of amides, alkanes, carboxylic acids, unhydrides and phenols. ^[19]
 Bacopa monnieri	It contains alkaloid brahmine, nicotine, herpestine, bacosides A and B, saponins A, B and C, triterpenoid saponins, stigmastanol, β-sitosterol, betulinic acid, D-mannitol, stigmasterol, α-alanine, aspartic acid, glutamic acid, and serine and	Used for memory boosting, prevent anxiety and stress disorder. It contains most powerful antioxidant.	Presence of FTIR band at 3368 cm ⁻¹ , 2927 cm ⁻¹ corresponding to H bonded alcohols and phenols. ^[20]

	pseudojujubogenin glycoside		
 Abrus precatorius Linn.	Glycyrrhizin, Triterpene glycosides, pinitol and alkaloids such as abrine, hepaphotone, choline and precatorine are the important chemical constituents	Remedy for painful swelling in the body.	Presence of characteristic IR absorption bands at 3427 cm ⁻¹ related to phenolic groups. ^[21]
 Lemon balm	It contains geraniol, neral, geranial, (E)-caryophyllene and citronellal	This is an immune stimulator, antibacterial and has antiviral property. Lemon balm essential oil is popular in aromatherapy.	Presence of hydroxyl groups are evident from the IR band at 3467 cm ⁻¹ . ^[22]
 Azadirachta indica	It contains nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol and amino acid, 7-desacetyl-7-benzoylazadiradione, 7-desacetyl-7-benzoylgedunin, 17-hydroxyazadiradione, and nimbiol	Prevents the development of insects. Used for liver problems. It also cures stomach ulcer.	The FTIR broad peak at 3402 to 3419 cm ⁻¹ corresponding to the O-H and C=O stretching. ^[23]
 Ocimum sanctum	The chemical constituents are Oleanolic acid, Ursolic acid, Rosmarinic acid, Eugenol, Carvacrol, Linalool, and β-caryophyllene,	This is used to prevent hair fall. Tulasi tea helps in weight loss. Used to cure cough and cold.	Presence of FTIR band at 3000, 3500 and 3337 cm ⁻¹ corresponding to the hydroxyl bonds of amines, alcohols and phenols. ^[24]
 Senna alexandrina	It contains anthraquinone glycosides – sennosides, especially sennosides A and B,	Joints and muscular pain can be cured and used to stimulate the intestine. It helps in weight loss.	Presence of alcohols and polyphenols corresponding to the FTIR peaks at 3427, 3402 cm ⁻¹ . ^[25]
 Rauvolfia serpentina	It contains Ajmaline group-ajmaline, ajmalinine and ajmalicine; and Serpentine group - serpentine and serpentinine.	It is the remedy for inability to sleep. Used to overcome hypertension. It is also used for high blood pressure.	Broad FTIR peak at 3462 cm ⁻¹ corresponding to the OH stretching of Phenolic groups. ^[26]

5. Comparison between Traditional Medicines and Modern Medicines

Modern medicines have widely spread in all over the world and globally most of the countries are depending on medicines. But modern medicines have emerged gradually from the experiential knowledge of traditional medicines.^[27] Comparing with modern medicine, traditional medicines have lot of benefits less time for research, testing, marketing and other process. The main advantage is low

risk of side effects as they are completely natural, the side effects are much less compared to pharmaceutical drugs. They are usually safe to the patients unless they are allergic to certain plant chemicals. Traditional healing practices are even popular in today's world.

Every human community responds to the challenge of maintaining health and treating diseases by developing a medical system. Thus, traditional medicine is now widely used in the region and practiced side by side in most of the countries. Generally, both the medicines traditional and modern have their own merits and demerits. In fact, now a days there is a huge increase in population being more prone to get deadly diseases because of their livelihood and the food they consume daily.

6. Advantages and Disadvantages of Traditional Medicines

It uses locally available plants. There is no dangerous waste requiring safe disposal. No problems of foreign exchange for expensive drugs or delays at customs. Usually cheap for the patient. Creates employment in the medicinal garden and the preparation of medicines Money paid for treatment stays in the local economy and also encourages self-reliance. The healer speaks the same language as the people. Herbs are not without disadvantages, and herbal medicine is not appropriate in all situations. These are a few of the disadvantages, modern medicine treats sudden and serious illnesses and accidents. An herbalist would not be able to treat serious trauma, such as a broken leg. Another disadvantage of herbal medicine is the very real risks of doing oneself harm through self-dosing with herbs. Where there is a very real risk of overdose.

7. Role of Traditional Medicines in COVID-19

Traditional medicine has a very important role in the treatment of several diseases. WHO is running a number of Institutes to select the traditional medicine for the management of COVID-19 [28]. There are some important Indian traditional plants with antiviral properties like *Somnifera*, *Tinosporacordifolia*, *Phyllanthusemblica*, *Asparagusracemosus*, *Giycyrrhizaglabra*, *Ocium sanctum* and *Azadirachtaindica* [29]. The severe acute respiratory syndrome-related coronavirus (SARS-CoV-2) or novel coronavirus9 (COVID-19) infection has been declared world pandemic. Although, some efforts are being made, some therapeutic approaches have been suggested such as nucleoside analogs, remdesivir, anti-inflammatory drugs or lopinavir/ritonavir to treat COVID-19 [30]. The four most prominently selected medicinal plants are *Nigella sativa*, *Vernonia amygdalina*, *Azadirachtaindica* and *Eurycomalongifolia*. *Nigella sativa* seeds showed antiviral properties by decreasing viral load,

alpha fetoproteins and improved the liver function parameters among hepatitis c infected patients. It also improves the immunity by increasing CD3 and CD4 counts and regulates interferon gamma (IFN- γ) release from natural killer T-cells and macrophages. It is also used in respiratory diseases such as asthma and this property proves that it can be used for a COVID-19. G.Amygdalium also known as v.amugdalina or bitter leaf also improves the immunity system in the body. This was used to relieve fever, diarrhoeas, cough and headache. Leaves of neem tree, popularly used in India as a medicinal plant and it is consumed for treating fever. Neem leaves demonstrated that its phytochemicals such as flavonoids and play saccharides have direct antiviral effects against various viruses including dengue and hepatitis c virus. Neem demonstrated that the derived compounds like nimbolin A, nimocin and cyclootands have the potential to develop membrane (M) glycoproteins of SARS-CoV-2 and acts as inhibitors. E.longifolia also helps in improving the immune system and the CD4+ counts in the body [31].

8. Conclusion

The potential of the medicinal herbs found in India is mostly unknown to common people. Their significance is unlimited and it is well revealed through the functional group analysis of Fourier Transform Infra-Red Spectroscopic measurements by many authors. It also revealed that the phenolic groups present in the plants are invariably responsible for their antioxidant and anti-microbial potential.

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