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IMPORTANCE AND USES OF MEDICINAL PLANTS – AN OVERVIEW

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ABSTRACT

A medicinal plant is any plant which, in one or more of its organs, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi-synthesis. When a plant is designated as medicinal, it is implied that the said plant is useful as a drug or therapeutic agent or an active ingredient of a medicinal preparation. Herbal medicines are in great demand in the developed as well as in the developing countries for primary health care because of their wide biological and medicinal activities, higher safety margins and lesser costs.

Key Words: Therapeutic purposes, Development, Altrnative Medicine, Herbalism.

INTRODUCTION

The term of medicinal plants include a various types of plants used in herbalism and some of these plants have a medicinal activities. These medicinal plants consider as a rich resources of ingredients which can be used in drug development and synthesis. Besides that these plants play a critical role in the development of human cultures around the whole world. Moreover, some plants consider as important source of nutrition and as a result of that these plants recommended for their therapeutic values. These plants include ginger, green tea, walnuts and some others plants. Other plants their derivatives consider as important source for active ingredients which are used in aspirin and toothpastes [1]. It has been estimated that about 13,000 species of plants have been employed for at least a century as traditional medicines by various cultures around the world. A list of over 20,000 medicinal plants has been published, and very likely a much larger number of plants.

ALTRNATIVE MEDICINE

The world's flowering plant species have been used medicinally. Sometimes the figure of 70,000 medicinal plant species is cited, but this includes many algae, fungi, and micro-organisms that are not really plants as the word is understood by botanists [2].

These days the term Alternative Medicine became very common in western culture, it focus on the idea of using the plants for medicinal purpose. But the current belief that medicines which come in capsules or pills are the only medicines that we can trust and use. Even so most of these pills and capsules we take and use during our daily life came from plants. Medicinal plants frequently used as raw materials for extraction of active ingredients which used in the synthesis of different drugs. Like in case of laxatives, blood thinners, antibiotics and antimalaria medications, contain ingredients from plants.

FUTURE OF MEDICINAL PLANTS

Medicinal plants have a promising future because there are about half million plants around the world, and most of them their medical activities have not investigate yet, and their medical activities could be decisive in the treatment of present or future studies in table 1 [3].

CHARACTERISTICS OF MEDICINAL PLANTS

Synergic medicine- The ingredients of plants all interact simultaneously, so their uses can complement or damage others or neutralize their possible negative effects.

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Support of official medicine- In the treatment of complex cases like cancer diseases the components of the plants proved to be very effective.

Preventive medicine- It has been proven that the component of the plants also characterize by their ability to prevent the appearance of some diseases. This will help to reduce the use of the chemical remedies which will be used when the disease is already present i.e., reduce the side effect of synthetic treatment.

CLASSIFICATION OF MEDICINAL PLANTS

Classification of medicinal plants is organized in different ways depending on the criteria used. In general, medicinal plants are arranged according to their active principles in their storage organs of plants, particularly roots, leaves, flowers, seeds and other parts of plant. These principles are valuable to mankind in the treatment of diseases. Reports on the classification of many plant species yielding vegetable oils used in cosmetics and body and skin care preparations are sporadic or lacking.

Classification According to the Usage

The herbs are classified in four parts: medicinal herbs, culinary herbs, aromatic herbs, ornamental herbs.

- Medicinal Herbs have curative powers and are used in making medicines because of their healing properties like marigold, lemon balm, lavender, johnny-jump-up, feverfew etc.
- Culinary Herbs are probably the mostly used as cooking herbs because of their strong flavours like oregano, parsley, sweet basil, horseradish, thyme etc.
- Aromatic Herbs have some common uses because of their pleasant smelling flowers or foliage. Oils from aromatic herbs can be used to produce perfumes, toilet water, and various scents. For e.g. mint, rosemary, basil etc.
- Ornamental Herbs are used for decoration because they have brightly coloured flowers and foliage like lavender, chives, bee balm, lemongrass etc [4].

Classification according to the Active Constiuents

According to the active constituents all herbs are divided into five major categories: Aromatic (volatile oils), Astringents (tannins), Bitter (phenol compounds, saponins, and alkaloids), Mucilaginous (polysaccharides), and Nutritive (food stuffs).

Aromatic herbs

The name is a reflection of the pleasant odour that many of these herbs have. They are used extensively both therapeutically and as flavourings and perfumes. Aromatic herbs are divided into two subcategories: stimulants and nervines.

Stimulant Herbs increase energy and activities of the body, or its parts or organs, and most often affect the respiratory, digestive, and circulatory systems. E.g. fennel, ginger, garlic, lemongrass [5].

Astringent Herbs

Tannins in Astringent Herbs have the ability to precipitate proteins, and this "tightens," contracts, or tones living tissue, and helps to halt discharges. They affect the digestive, urinary, and circulatory systems, and large doses are toxic to the liver. They are analgesic, antiseptic, ant abortive, astringent, emmenagogue, hemostatic, and styptic.

Bitter Herbs

Bitter Herbs are named because of the presence of phenols and phenol glycosides, alkaloids, saponins and are divided into four subcategories:

Diuretic Herbs induce loss of fluid from the body through the urinary system. The fluids released help cleanse the vascular system, kidneys, and liver. They are alterative, antibiotic, ant catarrhal, antipyretic, and antiseptic, lithotripter, and blood purifier in nature. asparagus, blessed thistle, burdock, butcher's broom, buchu, chaparral, chickweed, corn silk, dandelion, dog grass, grapevine, and parsley [5].

Mucilaginous Herbs

Mucilaginous herbs derive their properties from the polysaccharides they contain, which give these herbs a slippery, mild taste that is sweet in water. All plants produce mucilage in some form to store water and glucide as a food reserve. They eliminate the toxins from the intestinal system, help in regulating it and reduce the bowel transit time. They are antibiotic, antacid,demulcent, emollient, vulnerary, and detoxifier in nature. For e.g. althea, aloe, burdock, comfrey,dandelion, Echinacea, fenugreek, kelp, psylium,slippery elm, dulse, glucomannan from Konjak root, Irish moss, and mullein [5].

Nutritive Herbs

Wheat germ these herbs derive both their name and their classification from the nutritive value they provide to the diet. They are true foods and provide some medicinal effects as fibber, mucilage, and diuretic action. But most importantly they provide the nutrition of protein, carbohydrates, and fats, plus the vitamins and minerals that are necessary for adequate nutrition. For e.g. rosehips, acerola, apple, asparagus, banana, barley grass, bee pollen,bilberry, broccoli, cabbage, carrot, cauliflower, grapefruit, hibiscus, lemon,oat straw, onion, orange, papaya, pineapple, red clover, spirulina, stevia.

Classification According to their Herbs

Herbs also can be classified as annuals, biennials, and perennials. Annuals bloom one season and then die. Biennials live for two seasons, blooming the second season only. Once established, perennials live over winter and

bloom each season. They can last for many years with proper care. Annual herbs complete their life cycle in one year; start them from seed. The annuals have to be seeded each year unless conditions are favorable enough in the garden to seed themselves.

Classification according to Nature

Natural products are compounds consisting essentially of carbon derived from natural sources and that generally have very diverse and interesting properties. Some of the most relevant applications of the Natural Organic Products are using it as Fuels, plastics, fats, soaps, sugars.

Petroleum

(Petra = stone; Oil = oil) is a naturally formed by liquid mixture of hydrocarbons, which are processed in the petrochemical industry through fractional distillation and cracking to gasoline, natural gas, etc.

Soap

It is the sodium salt of a fatty acid. Have a party hydrophyllic (dissolves in water) and other lipophyllic (fat dissolves dirt).

Sugars

These are natural polyhydroxialdehides or polyhydroxiketones with different functions: structure, energy storage components of the nucleic acids, etc. They are formed by photosynthesis in plants and are classified into monosaccharides (glucose), disaccharides (sucrose) and polysaccharides (cellulose, starch, etc.) [6].

Sweeteners

These are natural or synthetic substance that gives a sweet taste to food. We can find natural sweeteners such as sucrose (cane and beet), fructose (sugar simpler and sweet, honey), lactose and galactose (sugars from milk, less sweet), and synthetic as: saccharin (300 times sweeter than sucrose), aspartame (160 times sweeter), etc. Industrial Use of Medicinal and Aromatic Plants 19

Agro-chemicals

pesticides, plant growth regulators, etc. Modifiers of animal behavior [6].

Flavours and perfumes.

Food Additives (flavours, colours, antioxidants, etc.)

Drugs

Product to be administered for curative purposes. Although there are many natural source products that are used as drugs, the synthesis of drugs is well developed and provides a large amount of chemicals that are used as such. For example: sedatives, anti inflammatories, diurethics, antiviral, hepatoprotectors, etc.

Regulators

Like dopamine, used for Parkinson´s síndrome (only L-Dopa is active) Antibiotics: chemical products able to inhibit the growth of microorganisms and even destroy them.

Classification Based on their Physiologic Activity

Approximately one half of the medicines used today are natural products, i.e. alkaloids, antibiotics or synthethic analogs. For that it is usually employed a classification that represents the physiologic activity, such as hormones, vitamins, antibiotics ad mycotoxins. Even though the compounds belonging to each group have different structures and biogenetic origins, a narrow relationship is occasionally between those aspects and activity [7].

Classification based on their taxonomy

This classification is based on morphological studies of plants, or plant taxonomy. In animals and some of the microorganisms, final metabolites are generally excreted outside the body, while in plant metabolites are stored inside the plant. While it was thought that some metabolites were specific of some plants, we know today that are widely distributed in the plant kingdom and many constituents of plants such as alkaloids and isoprenoides have been isolated from species, genera, families or specific plant. For example, the "opium" of Papaver somniferum contains twenty alkaloids such as morphine, thebaine, codeine, and narcotine. they are all biosynthesized from precursor 1-bencilisoquinolina by oxidative coupling [8].

Classification based on their biogenesis

Although biogenesis and biosynthesis are terms that are used sometimes indiscriminately, it is customary to use the first term for a hypothesis, and the last for a synthetic route tested experimentally. The constituents of all plants and animals are biosynthesized in organisms through enzymatic reactions. The most commonly source of carbon used is the glucose, which is photosynthesized in green plants obtained from the environment heterotrophic organisms. The relatively recent advances in biochemistry have greatly clarified the interplay between enzymatically catalyzed reactions of the primary metabolites and biopolymers. These metabolites lead to secondary metabolites, so called because it is obvious his role in the metabolism of many organisms [9].

PLANTS AS A BASIS OF SOME IMPORTANT DRUGS

Higher plants have been used as a source of drugs by mankind for several thousand years. In fact, ancient man was totally dependent on green plants for his day-to-

day needs of medicaments. With the development of modern medicine, synthetic drugs and antibiotics, the importance of plants as raw material for drugs decreased considerably. However, plants were used as a basis of some of the most important drugs, even in the modern system of medicine. With the advancement of synthetic organic chemistry most of the active constituents of plants used in medicine were synthesized. At one time it was thought that ultimately all the plant drugs would be obtained from synthetic sources.

Herbs used as Diuretics

Medicinal herbs are the significant source of Diuretics. Mono and poly-herbal preparations have been used as diuretics. According to one estimate, more than 650 mono and poly-herbal preparations in the form of decoction, tincture, tablets and capsules from more than 75 plants are in clinical use are as follows [8, 9].

Mangifera Indica

Mangifera Indica is a species of mango in the Anacardiaceae family. It is found in the wild in India and cultivated varieties have been introduced to other warm regions of the world. It is the largest fruit-tree in the world, capable of a height of one-hundred feet and an average circumference of twelve to fourteen feet, sometimes reaching twenty. Diuretic activity of *Mangifera Indica* bark extract in rats was studied by Shree devi. They use Ethyl acetate, ethanol and water extract of *Mangifera Indica* for evaluation of diuretic activity in fig 1[9].

Mimosa pudica

Mimosa pudica also called sensitive plant, sleepy plant is a creeping annual or perennial herb often grown for its curiosity value: the compound leaves fold inward and droop when touched or shaken, to protect them from predators, re-openingminutes later. The species is native to South America and Central America. It grows mostly in shady areas, under trees or shrubs in fig 2 [10].

Lepidium sativum

Lepidium sativum known as garden cress belongs to the family Brassicaceae. The seeds and leaves of the plant contain volatile oils. Garden cress seeds are bitter, thermogenic, depurative, rubefacient, galactogogue, tonic, aphrodisiac, ophthalmic, antiscorbutic, antihistaminic and diuretic in fig 3 [11].

Euphorbia thymifolia

Euphorbia thymifolia (Euphorbiaceae) is a small branched, pubescent, prostate annual herb, commonly known as laghududhika or choti-dudhi.The leaves, seeds and fresh juice of whole plant are used in worm infections, as stimulant, astringent. Kane S R et. al. investigated the diuretic activity of crude ethanolic extract and fractions of *Euphorbia thymifolia* in fig 4 [12].

Allium sativum

Allium sativum, commonly known as garlic, belongs to the family Liliaceae and genusn Allium.Garlic is used as carminative, aprodisic ,expectorant and disinfectant in the treatment of pulmonary conditions. Oil of garlic is used as anthelmintic and rubefacient. It has been noticed that garlic lowered the blood pressure and level of cholesterol and also possesses strong antimicrobial activity[13].

Spermicidal Activity

Achyrantes aspera

Extracts from roots of *Achyranthes aspera* have been reported to possess spermicidal activity in human and rat sperm, as studied by Paul *et al.* (2010) in fig 6.

Antiparasitic Activity

***Tephrosia purpurea* Linn**

Tephrosia purpurea Linn. belongs to family Leguninosae. It also called as Sarwa Wranvishapaka. It contains glycosides, rotenoids, isoflavones, flavnones, chalcones, flavonoids and sterols. According to Ayurvedic system of medicine various parts of this plant are used as remedy for impotency, asthma, diarrhoea, gonorrhoea, rheumatism, ulcer and urinary disorders. It is also used in the treatment of bronchitis, boils, bleeding piles, pimples, roots and seeds are used as insecticidal, vermifuge, leprous wound and the juice is used for the eruption on skin in fig 7 [14]

***Carica papaya* Linn**

Carica papaya Linn. belongs to family Caricaceae. Papaya fruits contains a mixture of cysteine endopeptidases such as papain. Chympopapain A and B, papaya endopeptidase II, papaya endopeptidase IV, omega endopeptidase, chinitase, protease-inhibitors, and proteins. Papaya fruits posses wound healing properties, papaya latex was applied to the burn wound using hydrogel as a vehicle system in fig 8 [15].

Anti -inflammatory activity

Phyllanthus polyphyllus

It is a small shrub used in anti-inflammatory folk medicine in tropical and subtropical regions in India and Srilanka. Four compounds, one benzenoid and three arylnaphalide lignans isolated from whole plant showed growth inhibitory effect on production of NO and cytokines (TNF-α and IL-12) . Since TNF-α and IL-12 were known as the main pro-inflammatory cytokines secreted during the early phase of acute and chronic inflammatory diseases, such as asthma, rheumatoid arthritis, septic shock. The use of *Phyllanthus polyphyllus* as anti-inflammatory remedy in traditional medicine may be attributed by these compounds in fig 9 [16, 17]

***Curcuma longa* (Haridra)**

Traditionally, *Curcuma longa*, known as Haridra or Haldi or turmeric in India, belongs to the family Zingiberaceae. It contains the active phytochemical such as alkaloid – curcumin which possesses a range of pharmacological properties-anti-inflammatory, anti-oxidant, antimicrobial, anti-carcinogenic, anti-diabetic, and neuroprotective activities [19] Recent studies have also demonstrated the anti-depressant activity in mice using the TST and FST which was of greater potency than fluox in fig 10 [20]

Morinda officinalis

Morinda officinalis, belongs to the familyRubiaceae and grows in humid areas of South East China. The ethanolic extract of *M. officinalis* showed antidepressant-action in rodent animal models of depression which tested in FST and learned helplessness through increase in serotonin levels at the neuron in fig 11[21]

Cardiovascular Activity

Achyranthine

Achyranthine, is a water-soluble alkaloid isolated from Achyranthes aspera, decreased blood pressure and heart rate, dilated blood vessels, and increased the rate and amplitude of respiration in dogs and frogs. The contractile effect of the alkaloid at 0.5 mg/ml on frog rectus abdominal muscle was less than that of acetylcholine and its spasmogenic effect was not blocked by tubocurarine [22].

Table 1. Some medicinal plants of central India having good antioxidant potential

Name of the plant	Part of the plant	Active component(s)
Acorus calamus	Rhizomes	Alkaloids
Aegle marmelos	Leaves	Alkaloids,Terpenoids, Saponins
Aloe vera	Leaf	Vitamin A,C,E, Carotenoids
Andrographis paniculata	Whole plant	Diterpenes, Lactones
Carica papaya	Leaves	Terpenoids. Saponins, Tanins
Cassia fistula	Bark	Flavonoids

Fig 1. *Mangifera Indica*

Fig 2. *Mimosa pudica*

Fig 3. *Lepidium sativum*

Fig 4. *Ephorbia thymifolia*

Fig 5. *Allium sativum*

Fig 6. *Achyrantes aspera*

Fig 7. ***Tephrosia purpurea***

Fig 8. ***Carica papaya***

Fig 9. ***Phyllanthus polyphyllus***

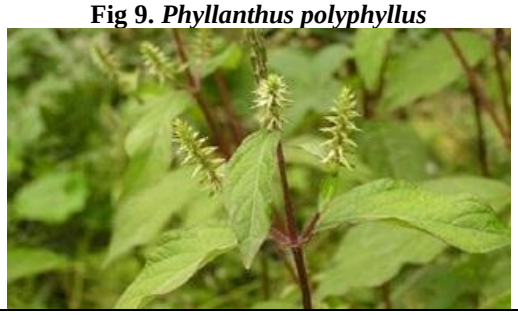

Fig 10. ***Curcuma longa***

Fig 11. ***Morinda officinalis***

CONCLUSION

Medicinal plants belong to a big plant group with a great interest due to its pharmaceutical, cosmetic and nutritional application. In addition, they are also an alternative to traditional crop with species in high demand at the current international market [23, 24]

The review has included the botanical characteristics of the plant which helps in identification of the plant, Ethno botany which give traditional use of the plant, and the reported activities of the plant. However, the number of studies is limited and we recommend that further studies to be conducted to confirm reported activities. By this review, it can be concluded that in the core of the nature there are so many plants which possess potent diuretic activity. Herbal medications are free from side effects and toxicity unlike the allopathic medicines.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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