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A REVIEW ON TRADITIONAL MEDICINAL PLANTS WITH ANTI-ASTHMATIC POTENTIAL

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ABSTRACT

Respiratory disorders constitute a major public health problem worldwide. Asthma is a major noncommunicable disease affecting both children and adults, and is the most common chronic disease among children. Asthma is a disease that mainly affects our respiratory system.Asthma is often under-diagnosed and under-treated, particularly in low- and middle-income countries. Plants have been used for generations and are more affordable and easily available – even in rural areas and are well known for their medicinal properties and safety profile from the ancient times. This review work was focussed on the chemical constituents and biological properties of therapeutically active plants which are used in treatment of asthma.

KEY WORDS: - Asthma, Ephedra, Allergens, Wheezing

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INTRODUCTION

Asthma is a chronic inflammatory lung disease in which airways narrow and swell and may produce extra mucus. This can make breathing difficult and trigger coughing, a whistling sound (wheezing) during breathing. Asthma may be caused by Allergic reactions to environmental allergens such as pollens, molds, dust mite or animal dander, Colds and viral respiratory infections, Exercise, Changes in weather, exposure to cold air or sudden temperature change, Irritants such as tobacco smoke, air pollution, paints and cleaning agents, Strong odours and/or perfumes [1]

Natural products play a important role in development of cosmetics, dietary supplements, and drugs and these are used to treatment of several diseases from the starting from man civilisation.Natural products have been also used for over 1000 years as one of the most promising sources of new medicines These may lead to basic research on potential bioactive components for commercial development as lead compounds in drug discovery.A number of compounds are identified and isolated from the plant were confirmed by phyto-pharmacological evaluation. The strong ethnobotanical background of plantscould be a valuable tool to find new anti-asthmatic medications. From 5000 years a number of plants are used in the treatment of asthma [2] in this review article we are trying to summarise those plants which are used in treatment of asthma.

Traditionally used Plants for the treatment of asthma

The drugs currently used in treatment of asthma to reduce the inflammation of air ways but the symptoms return back when the treatment is stopped [3] Therefore, plant products are still widely used to treat the asthma.

1. *Crocus sativus*

Crocus sativus or saffron, belongs to family Iridaceae commonly used for the treatment of liver disorders, coughs, as an anti-inflammatory agent in Iranian traditional medicine. C. sativus and its constituents have been shown to have beneficial effects on the coronary artery respiratory nervous system and gastrointestinal diseases [4]. The effects of saffronand its constituents on respiratory disorders in traditional medicine were reviewed. These effects of Saffron are because of presence of kaempferol, safranal, phenol, delphinidin, flavonoid, crocetin, fat, carbohydrates, minerals, vitamins, and other secondary metabolites such as anthocyanins, carotenoids, flavonoids, and terpenes [5]

Fig 1: Crocus sativus

Fig 2: Boswellia serrata

2. *Boswellia serrata*

Salai guggal is an oleo-gum-resin obtained from Boswellia serrata. Its essential oil is a mixture of mono, di and sesquiterpenes, gum composed of pentose and hexose sugar with some digestive enzymes. Resin is the most important fraction of *Salai guggal* comprising mainly of pentacyclic triterpenic acids namely Boswellic acids. It hasanti-inflammatory, anti-arthritic, anti-rheumatic, anti-diarrhoeal, anti-hyperlipidemic, anti-asthmatic, anti-cancer, anti-microbial, analgesic activity, hepatoprotective and immunomodulatory activity. Boswellic acids is specific, non-redox inhibitor of 5-lipoxygenase, an enzyme involved in arachidonic acid metabolism. [6]

3. *Justicia adhatoda*

Justicia adhatoda belongs to family Acantharean is a shrub widespread throughout the tropical regions

of Southeast Asia [7]. It has medicinal uses, mainly antispasmodic, fever, reducer, anti-inflammatory, anti-bleeding, bronchodilator,anti-diabetic, disinfectant, anti-jaundice and oxytocic, It is antiperiodic, astringent,diuretic, purgative and is also used as an expectorant in addition to liquefy sputum, tubercularactivities. J. adhatoda plant has essential oils, fats, resins, sugar, gum, amino acids, proteins and vitamins 'C' etc). The phytochemical analysis show that phenols, tannins, alkaloids, anthraquinone, saponins, flavonoids and reducing sugars were found in the leaves of J. adhatoda [8]

Fig 3: Justicia adhatoda

Fig4: Piper longum

4. *Piper longum*

Piper longum belongs to family. Piper longum contains a large number of alkaloids and related compounds like methyl piperine, piper-nonaline, piperettine, asarinine, pellitorine, pipe-rundecalidine, piperlongumine, piperlonguminine, retrofractamide A, pergumidiene, brachystamide-B, tetrahydro piperine. Piperine, pip-erlongumine, tetrahydropiperlongumine, trimethoxy cinnamoyl-piperidine, and piperlonguminine. Because of these chemical constituents plant has Anticancer, Hepatoprotective, Antioxidant, Anti-inflammatory, Immunomodulatory, Coronary vasodilation, Antimicrobial, Antiplatelet Antifertility, Antihyperlipidemic Antiobesity, Analgesic, Larvicidal, Antidepressant Antifungal activities.[9].

5. *Cinnamomum tamala*

Cinnamomum tamala belongs to family Lauraceae. It is used in curing a number of ailments. All parts of the plant possess many major bioactive chemical constituents like cinnamaldehyde, trans-cinnamaldehyde, 3,4,5,7- tetrahydroxyflavone, 3,3,4,5,6- pentahydroflavone (non-glycoside compounds), kaempferol, eugenol, etc. These phytochemical compounds have many pharmacological activities such as anticancer, antidiabetic, antimicrobial, hepatoprotective, antidiarrheal and immunomodulatory. Their medicinal use was also mentioned in the literature of ayurveda, yunani and other traditional systems of medicine [10]

Fig 5: Cinnamomum tamala

Fig 6: Sesbania grandiflora

6. *Sesbania grandiflora*

Sesbania grandiflora belongs to familyFabaceae. It is used for thrombosis, diarrhea, antinflammatory diseases and against couple ofsignificant bacterial pathogens and also used in the treatment of bronchitis, cough, vomiting, wounds ulcers, diarrhoea, and dysentery. S. grandiflora has antioxidant, antiuroithiatic, anticonvulsive, anti-ligament, anti-inflammatory, anti-helminthic, antibacterial and anxiolytic activity [11]. These activities are due to the presence of alkaloids, flavonoids, glycosides, tannin, anthraquinone, steroid, pholobatannins, and terpenoids,isovestitol, medicarpin, and sativan , along with another known compound, betulinic acid[12].

7. Ephedra

Ephedra Sinica also called ma huang, belongs to familyEphedraceae. It is used in Traditional Chinese Medicine (TCM) for more than 5,000 years, primarily to treat asthma, bronchitis, and hay fever. It is also prescribed for symptoms of cold and flu, including nasal congestion, cough, fever, and chill. Ephedra contains flavonoids (leucodelphinidin, leucopelargonine, leucoantho-cyanidin, lucenine, vicenin-1, and vicenin-2), tannins, benzylmethylamine. Tannins, mainly proanthocyanidines, are constituents of many Ephedra species. A new naphthalene derivative, 1-methyl-2,3-methylenedioxy-6-naphthalenecarboxylic acid methyl ester (1), and a new alkaloid, (+/-)-1-phenyl-2-imido-1-propanol (2), together with the four known compounds, ephedrine, pseudoephedrine, N-methyl ephedrine, and 6-methoxykynurenic acid, have been isolated from the Ephedra sinica,[13] The phytochemicals in ephedra for the treatment of asthma are ephedrine and pseudoephedrine. Ephedrine acts as the prototypical α and β adrenergic receptor both direct and indirect effects.Ephedra potentiates the effects of methyl xanthine drugs that are used commonly in treatment of asthma. Theophylline is one example of a methyl xanthine bronchodilator. Studies of ephedrine–theophylline combination treatments in children with exercise-induced asthma and chronic asthma found significant increases in side effects, but only a slight increase in effectiveness compared with using either agent as monotherapy[14].

Fig 7: Ephedra Sinica

Fig 8: Glycyrrhiza glabra

8. Liquorice

Liquorice is the common name of *Glycyrrhiza glabra* belongs to family Fabaceae. The Liquorice has been used traditionallyused to restore breathing, calm the breathing passageways, 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 shown by active compounds of licorice including triterpene, flavonoids, and saponins. [15].

9. Adhatoda

Adhatoda vasica belonging to family Acanthaceae is commonly known as Adosa. It is also called "Vasaka". It is used for removing of intestinal parasites for treating diarrhoea and dysentery, fresh wounds, rheumatic joints and inflammatory swellings, scabies and other skin diseases. Vasaka h is used for treating cold, cough, chronic bronchitis and asthma. In acute stages of bronchitis,

vasaka gives unfailing relief, especially where the sputum is thick and sticky. It liquefies the sputum so that it is brought up more easily. For relief in asthma, the dried leaves should be smoked. These activities are shown due to presence of active ingredients like vasicine, oxyvascicine and vasicinone .[16]

Fig 9: Adhatoda vasica

Fig 10: Ginkgo Biloba

10. *Ginkgo Biloba*

Maidenhair is the common name of *Ginkgo biloba* belongs to family Ginkgoaceae. It is widely used herbal medicinal products, food and dietary supplements. A variety of bioactive compounds such as terpenoids (e.g., ginkgolides, bilobalide), flavonoids (e.g., kaempferol, quercetin, isorhamnetin), biflavonoids (e.g., sciadopitysin, ginkgetin, isoginkgetin), and organic acids (e.g., ginkgolic acid*)* [17] Ginkgo biloba has many health benefits. It's often used to treat mental health conditions, Alzheimer's disease, and fatigue.Ginkgo works to inhibit PAF (platelet activating factor), a powerful inducer of platelet aggregator and anaphylactic reactions. Natural Herbs that stimulate anti-PAF activity are known to assist in the treatment of asthma, allergic reactions, thrombosis and shock [18]

11. *Curcuma longa*

Turmeric (*Curcuma longa*) is evergreen plant belongs to family Zingiberaceae. Turmeric (Curcuma longa) is extensively used as a spice, food preservative and colouring material in India, China and South East Asia. It has been used widely in the traditional medicine all over the world. Curcumin is the the main yellow bioactive component of turmeric has been shown to have a wide spectrum of biological actions. It has anti-inflammatory, antioxidant, anticarcinogenic, antimutagenic, anticoagulant, antifertility, antidiabetic, antibacterial, antifungal, antiprotozoal, antiviral, antifibrotic, antivenom, antiulcer, hypotensive and hypocholesteraemia activities [19].

Fig11: Curcuma longa

Fig 12: Scutellaria baicalensis

12. Scutellaria baicalensis

Scutellaria baicalensis, also known as Chinese skullcap is a plant belonging to lamiaceae family. The Chineseskullcap is rich source of flavonoids such as baicalin, baicalein, Oroxylin A, wogonin, liquiritigenin and isoliquiritigenin.[20]. These inhibit histamine release from mast cells in vitro. Baicalin showed antiasthma tic activity (antihistaminic and anticholinergic activity) in isolated tracheal muscle from asthmatic guinea pigs Reducing hypersensitivity and inflammation in airways is vital to managing asthma [21]

13. Allium sativum

Allium sativum Garlic belongs to familyAmaryllidaceae. Alliumsativum and itsorganosulfur compounds especially allicin. The most important chemical constituents of this plant are allicin, diallyl disulphide, S-allylcysteine, and diallyl trisulfide. These chemicals were used for the treatment of inflammation, cancer, blood pressure, atherosclerosis, and hyperlipidemia It also has anti-viral, anti-bacterial, anti-fungal, anticoagulative and antioxidant effects[22] Garlic has anti-inflammatory properties, Because asthma is an inflammatory disease, garlic may be able to help relieve symptoms.

Fig13: Allium sativum

Fig 14: Trifolium pratense

14. *Trifolium pratense*

Red Clover- (*Trifolium pratense*) belongs to familyLegume.Red clover seeds have flavonoid compounds like quercetin, taxifolin, taxifolin-O-hexos derivatives, hyperoside, and isoquercitrin, and small amounts of other phenolic compounds. Taxifolin has been shown to exhibit anti-inflammatory effects, plasma cholesterol lowering effects, and anticarcinogenic, hepatoprotective, and antiviral activities. [23]

15. *Coleus*- barbatus

Coleus barbatus belong to family Lamiaceae. *Coleus barbatus* plant is used in various diseases Asthma, painful menstrual periods, hypertension, skin conditions, bronchodilator, urinary tract infection, glaucoma etc.[24] It has terpenoids, tannins, flavonoids, phlobatannins, saponins and cardiac glycosides 14-deoxycoleon , demethylcryptojaponol , alpha-amyrin , betulic acid), alpha-cedrol and beta-sitosterol[25] .

Fig 15: Coleus- barbatus

CONCLUSION

There are many treatments associated with diseases- Plant produced medicines and allopathic medicines are the two most common systems used in health care. But now a days nutraceutical therapy is also becoming the interest of peoples because it provides medicinal and health benefits. Allergens and Inflammation is a key player in the pathogenesis of Asthma.Medicinal plants remain the main ingredients of indigenous medicines.This review has shown the medicinal plantsthose are helpful in their management. The chemical constituents of these plants have anti-inflammatory, antispasmodic, anti-allergic, antibacterial, demulcent, antitussive properties and also maintain and nourish the lungs (or the airways).

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