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A critical review on herbal management of asthma in Kannur district of Kerala state

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Abstract

For thousands of years, medicinal plants have been played an important role throughout the world in treating and preventing a variety of diseases. The present paper aims at the review on various medicinal plants used by the population of Kannur district of Kerala state in the management of asthma. A wide number of ethno botanical surveys conducted in many tribal pockets and rural parts of Kannur district of Kerala have reported a countable number of medicinal plants with high therapeutic effect in the management of asthma. Apart from the tribal's, the review also includes the plant data collected from ayurvedic physicians and common people in the villagers of different parts of Kannur.

Keywords: asthma, medicinal plants, tribals

Introduction

Asthma is a disease of the airways which is chronic in nature. The inflammation of the airways results in increased contractibility of the smooth muscles which are surrounding the airways. As a result of this, the airways are narrowed and finally it results in wheezing. The causes of asthma are both environmental and genetic (Martinez, 2007). Epigenetic as well as the changes occurring in the environment cause asthma (Dietert, 2011). Allergens, air pollution, high ozone levels, traffic pollution, cockroaches, dust mites, animal dander, mold and smoking are the factors that result in asthma. Asthma is essentially characterized by the restriction of obstruction tracheal muscle (Arshad, 2010; Custovic et al, 2012; Gold et al, 2005 and Kelly et al, 2011).

Herbs are used as a natural remedy for the management of asthma. The treatment of asthma is mainly focused on the strengthening of the health of the lungs, nervous and immune systems. This generally requires long time therapy and more over the people has been realized serious adverse effects of the synthetic drugs which are used in the management of asthma. As a result, the world has started exploring the herbs as an agent of asthma therapy. Plants which are comparatively economical, easily available, and relatively free from the hazardous side effects are usually selected (Aashish Phadke, 2005).

Review on rare Anti asthmatic Plants present and used in Kannur district:

The first part of the review includes certain plants which are used by the tribals in treating various respiratory diseases. Some of these plants are not yet explored for the search of medicinally active ingredients. Hence they may not be having scientifically proven data in the management of asthma. Hence these noteworthy observations have to be scientifically evaluated to bring them into main stream of medicine. The review has been done on the basis of the information collected from "Mavilan" tribal community of Chemperi village of Kannur district and "Kurichya" tribal community of Kannavam village of Kannur district. A survey was carried out for a period of one year and the medicinal value of these plants were collected through the interviews among the Kurichya and Mavilan traditional healers. During the present study 9 different medicinal plants used in the management of respiratory disorders which belongs to 8 families were documented and their authenticity pertaining to botanical identity has been confirmed from the herbalist. The plants were also identified with the help of relevant published flora (<http://kannur.gov.in/climate.htm>)

***Alpinia calcarata* (Zingiberaceae)**

Alpinia is a genus of flowering plants in the ginger family. It is a rhizomatous perennial herb, which is commonly used in the traditional medicinal systems in Sri Lanka. *Alpinia calcarata* is cultivated in tropical countries, including Sri Lanka, India, and Malaysia. Experimentally, rhizomes of *Alpinia calcarata* are shown to possess antibacterial, antifungal, anthelmintic, antinociceptive, anti-inflammatory, antioxidant, aphrodisiac, gastroprotective, and antidiabetic activities. Phytochemical screening revealed the presence of polyphenols, tannins, flavonoids, steroid glycosides and alkaloids in the extract. Essential oil and extracts from this plant have been found to possess wide range of pharmacological and biological activities. Rhizome part is used in respiratory ailments (Md Atiar Rahman and Md Shadihul Rahman, 2015)

***Acalypha indica* (Euphorbiaceae)**

Acalypha indica is a weed widely distributed throughout India. It has been reported to be useful in treating pneumonia, asthma, rheumatism and several other ailments. The dried leaves of *Acalypha indica* was made into a poultice to treat bedsores and wounds and the juice of *Acalypha indica* is added to oil or lime and used to treat a variety of skin disorders. Dried leaves are used in treating asthma (Chopra R N et al, 1956; Bourdy et al, 1992).

***Adiantum capillus-veneris* (Pteridaceae)**

Adiantum capillus-veneris, is a deciduous, clumping fern with a drooping habit that grows to 15-20" tall and slowly spreads by short creeping rhizomes. It is found in temperate climates from warm-temperate to tropical, where the moisture content is high but not saturating. Rhizomes are used in the treatment of asthma (Wildflower.org-NPIN, 2011).

***Borassus flabellifer* (Arecaceae)**

Borassus flabellifer is a tall erect palm which can be recognized by its large and fan shaped leaves. The plant is used for the various ailments like secondary syphilis, heart burns, liver and spleen enlargement etc. the various parts of the plant are a rich source of phyto constituents like gums, saponins, glycosides, carbohydrates, albuminoids, fats, vitamins A, B and C. The fruit is considered to be used in asthmatic conditions (Sudhakar Kommu et al, 2011).

***Butea monosperma* (Fabaceae)**

Butea monosperma is commonly known as Flame of the forest. The flowers are widely used in the treatment of hepatic disorders, viral hepatitis, and diarrhea. The flowers are also good source of flavonoids. It is an erect, medium-sized, 12-15 m high, deciduous tree with a crooked trunk and irregular branches. Dried stem bark is used in respiratory disorders (Anonymous, 2002; Kirtikar and Basu, 1999; Kirtikar and Basu 2002).

***Cissampelos pareira* (Menispermaceae)**

Cissampelos pareira is a slender tomentose climber. The leaves are peltate, obtuse, mucronate. Flowers are small in size, Seeds are horse shoe shaped. The tribals were using seed of this plant as a source of medicine in treating various respiratory disorders (<http://eol.org>).

***Elephantopus scaber* (Asteraceae)**

Elephantopus scaber is a tropical perennial herb that grows

widely in many Asian countries such as China, India, Vietnam, Malaysia etc. The herb is erect and hairy with a height of 30-60 cm. The flowering heads are numerous, sessile and forming a large terminal inflorescence comprising about four violet flowers. The plant is a major part of several traditional medicinal formulations to treat diarrhea, dysentery, neoplasm and liver diseases. The major active ingredient is sesquiterpenoids. Pharmacological activities of sesquiterpene lactones include antimicrobial, antiviral, anti-inflammatory, anti-tumor. Flowers are utilized for respiratory disorders (Matos FJA et al, 1991; Picman AK, 1986).

***Feronia limonia* (Rutaceae)**

Feronia limonia is well known in Indian traditional systems for its uses. Various parts of the plant have astringent, constipating, diuretic, carminative, and cardio tonic traditional uses. Various important phytoconstituents like alkaloids, phenolic compounds, triterpenoids, coumarins, tannins, steroids etc. have been isolated from the plant. But only few pharmacological activities like antimicrobial, antiviral, antitumor, and antifungal and CNS depressant activity have been scientifically reported. From enormous traditional uses documented in various traditional system of medicine and presence of vital phytoconstituents make this plant to be explored scientifically to prove various traditional uses (Qureshi AI et al, 2010).

***Pongamia pinnata* (Fabaceae)**

Pongamia is a genus having one species only *Pongamia pinnata*. It is a medium sized glabrous, perennial tree grows in the littoral regions of South Eastern Asia, Australia and India. Root, bark, leaves, flower and seeds of this plant have medicinal properties. All parts of the plant have been used as crude drug for the treatment of tumors, piles, skin diseases, wounds and ulcers. The flowers are used in treating diseases associated with respiratory system (Tanaka T et al, 1992; Savita Sangwan, 2010).

***Piper chaba* (Piperaceae)**

Piper species are widely distributed in the tropical and subtropical regions of the world. The plant *Piper chaba* is a climbing, glabrous shrub available in various parts of India and Malay Islands. It is used as spice in meat curry and other dishes and believed to have medicinal value in a wide variety of disease conditions including arthritis, asthma, bronchitis and piles. Leaves are used in the treatment of asthma (Kirtika and Basu, 1987).

Review on common anti asthmatic plants present and used in Kannur district

The following are the most commonly used plants in the treatment of asthma by ayurvedic physicians of Kannur district, which are already proved scientifically. Although, a variety of medicinal plants for asthma can be found in literature, there is a need for the isolation and characterization of the bioactive compounds responsible for the anti asthmatic properties. This is considered as one of the major aim for this part of the review. The article will also be helpful for the researchers in asthma and its management.

***Adhatoda vasica* (Acanthaceae)**

Adhatoda vasica commonly known as Adosa, is a small, evergreen shrub found many regions of India and

throughout the world, with a many of uses in traditional Ayurveda. The leaves of *Vasica* are shows stimulant effect on the respiratory system. The plant is well known in Ayurveda for its beneficial effects in respiratory ailments, particularly as an expectorant in bronchitis. (Dorsch W and Wagner H, 1991; Atul Kumar et al, 2014).

***Acorus calamus* (Araceae)**

Acorus calamus is a medicinal plant found application in ayurvedic medicine for several years. The rhizome part is used to treat several diseases like asthma and bronchitis. The rhizome is also used as a sedative. *Acorus Calamus* (Linn) ethanolic extract possess highly substantial anti-asthmatic activity by significantly inhibited the histamine induced broncho constriction of guinea pig representing its H1 receptor antagonistic activity and support the plants by its anti-asthmatic properties. In asthma mostly drugs effective are steroid. Phytochemically the plant discloses the presence of steroidal flavonoids. The antiasthmatic activity showed by the plant may be because of this chemical moiety (Prachi Saxena and Priyanka Saxena, 2014).

***Allium sativum* (Liliaceae)**

Evidences suggests that compounds naturally present in garlic can treat asthma and also can reduce and cure symptoms associated with other respiratory ailments. Histamine, a natural chemical generated by the body, is involved in many allergic reactions and is known to promote inflammation in asthma sufferers. In addition to its effects on histamine release and breakdown, garlic can boost the ability of the body to create prostacyclins. Prostacyclins are lipid molecules which keep the air passages of the lungs open and thus promote easy breathing in asthmatic individuals. Garlic has higher concentration of sulfur compounds than any other *Allium* species and these sulfur compounds are responsible for pungent odor of garlic and many of its medicinal uses. One of the most biologically active sulfur compound in garlic is allicin (<http://www.Gebreselema> Gebreyohannes and Mebrahtu Gebreyohannes, 2013).

***Aerva lanata* (Amaranthaceae)**

Aerva lanta Linn. is an erect herbaceous common wayside weed. The *Aerva lanata* comprises alkaloids, flavonoids, phenols, tannins, proteins, amino acids and carbohydrates. In ethano medicine *Aerva lanata* is regarded as a valuable medicine for cough, sore throat, indigestion, wounds and as a vermifuge for children. The ethanolic extract of aerial parts of *Aerva lanata* exhibits significant dose dependent antiasthmatic activity. The ethanolic extract significantly inhibited the clonidine induced catalepsy. The inhibition of clonidine induced catalepsy by *Aerva lanata* may be due to the potential to antagonize H1 receptor or inhibition of mast cell degranulation induced by clonidine (Chatterjee A and Chandraprakash IW, 1992; Deepak Kumar et al, 2009).

***Aegle marmelos* (Rutaceae)**

Its leaf extract is being used in Indian system of medicine as an antidiabetic agent and in the management of asthma. Therefore the effect of the alcoholic extract of the leaves of *Aegle marmelos* plant produces a positive relaxant effect in isolated guinea pig ileum and tracheal chain, respectively. In addition, they antagonized the contractions, which are

produced by histamine (Arul V et al, 2004; Teotia UVS et al, 2014).

***Andrographis paniculata* (Acanthaceae)**

Andrographis paniculata has been associated with the development of asthma. Andrographolide, the principal active component of the medicinal plant *Andrographis paniculata* has been shown to inhibit NF-Kappa B activity (Kemeny DM et al, 2009).

***Bacopa monnieri* (Scrophulariaceae)**

Bacopa monnieri, is a small, creeping herb with numerous branches, small oblong leaves, and light purple flowers. The extract of the plant possess relaxant properties in tracheal muscle of rabbit and guinea-pigs. It also produces broncho dilation in anaesthetized rats supported the traditional use of this plant in for various respiratory ailments. Bronchodilator property of extract may be reflected by antagonism of carbachol induced effects on inspiratory and expiratory pressures (Samiulla DS et al, 2001; Bone K, 1996; Yadav Kapil Deo and Reddy KRC, 2013).

***Curcuma longa* (Zingiberaceae)**

Curcuma longa, a perennial herb, is identified by its oblong, pointed leaves and bearing funnel-shaped yellow flowers growing up to three to five feet of height. This herb is pharmacologically safe, as it is consumed as a dietary herb. The pharmacological studies which were carried on curcumin had showed a significant anti-asthmatic activity. Since, the effectiveness of curcumin has been utilized among ethnic population, especially for anti-cough or as an expectorant (Saikat Sarkar et al, 2015).

***Datura metel* (Solanaceae)**

The whole plant, but especially the leaves and seed is antiasthmatic, antispasmodic, antitussive, and bronchodilator. In China, the plant is used in the treatment of asthma. In Vietnam, the dried flowers and leaves are cut into small chips and used in antiasthmatic cigarettes Chopra RN et al, 1986).

***Glycyrrhiza glabra* (Leguminosae)**

Glycyrrhiza glabra Linn is one of the most extensively used medicinal herb from the ancient medical history of Ayurveda. The liquorice powder and extract was found to be effective in treatment of sore throat and cough. Like carbenoxolone liquorice extract may also be able to stimulate tracheal mucus secretions producing demulcent and expectorant effects (Murray W.J et al, 1998; Jahan Y et al, 2012; Monica Damle et al, 2014 and Sapan Patel et al, 2009).

***Picrorhiza kurroa* (Plantaginaceae)**

Picrorhiza rhizome or 'Indian gentian' obtained from *Picrorhiza kurroa* contains bitter iridoid glycosides. It is used in India to treat liver ailments. Anti-asthmatic activity of *Picrorhiza kurroa* has been studied extensively. The crude extract of *Picrorhiza.kurroa* roots reduced the frequency and severity of asthmatic attacks and the need for regular bronchodilators. The activity has been attributed to compounds such as androsin and apocynin, which have been shown to inhibit allergen and PAF- induced bronchoconstriction (Bantawa P et al, 2011).

***Solanum melongena* (Solanaceae)**

The methanol extract of fresh leaves of *Solanum melongena* was evaluated for its capacity to alter the tone of isolated, precontracted guinea pig tracheal chains, as well as for its possible mechanism of action. *Solanum melongena* extract exerted a broncho spasmogenic rather than a broncho spasmolytic effect, probably through muscarinic receptor (Mans DRA et al, 2004).

***Sida cordifolia* (Malvaceae)**

The leaves contain small quantities of both ephedrine and pseudoephedrine. Ephedrine which is an anti asthmatic alkaloidal amine is known to stimulate the central nervous system and as such can enhance weight loss (Ghosal S et al, 1975).

***Withania somnifera* (Solanaceae)**

The leaves of the plant are reported to contain 12 withanolides, 5 unidentified alkaloids many free amino acids, chlorogenic acid, glycosides, glucose, condensed tannins, and flavonoids Withaferin A, a steroidal lactone is the most important withanolide isolated from the extract of the leaves and dried roots of *Withania somnifera* (Anonymous, 1982; Khare CP, 2007).

***Zingiber officinalis* (Zingiberaceae)**

Zingiber officinalis, commonly known as ginger. It is consumed worldwide as a spice and flavoring agent and is attributed to have many medicinal properties. Fresh ginger has been used for cold induced disease, nausea, asthma, cough, colic, heart palpitation, swellings, dyspepsia, loss of appetite, and rheumatism. Injection of 6-shogaol isolated from the rhizome showed an intense antitussive action in comparison with dihydrocodeine phosphate (Ghosh AK, 2011).

Conclusion

The traditional and ethno medicinal literatures showed that the plants are very effective and safe for medicinal uses. The continuous and perpetual people's interest in medicinal plants has brought about today's modern and sophisticated fashion of their processing and usage. In this review an attempt has been made to provide herbs which can be used single or polyherbal formulations on the basis of drug action at particular sites of patho-physiological cascade of asthma not only treating but also provide prophylaxis however more subsequent clinical studies are required to establish it. This type of studies may provide valuable information to researchers, biochemists and pharmacologists in screening of individual species and their phytoconstituents to accelerate the drug discovery and development process for the management of asthma.

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