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Antimicrobial and Antiasthmatic Properties of Plants

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ABSTRACT

Asthma is a disease that mainly affects our respiratory system. It affects millions of people in the world. It is most common chronic and non-communicable disease in adults as well as children. It is more prevalent in industrialized countries. Asthma is caused by the genetic interaction and environmental factors. The major risk factor for developing asthma is the genetic disposition of individual. Asthma symptoms are caused due to the liberation of endogenous and intrinsic mediators like histamine, nitric oxide, chemokines, inflammation of the airways in the lungs. Therefore, there are many treatments associated with this disease. One of which is the nutraceutical therapy which provides medicinal and health benefits. Indian herbs and plants are well known for its medicinal properties from the ancient times. *Allium* species, *Aloevera, crinum, Licorice, Adhatoda* species that possess the antimicrobial activities are known to provide efficient therapeutic response in treating asthma.

Keywords: Airway disorder, Inflammatory disease, Antimicrobial, Antiasthmatic, Medicinal plants.

INTRODUCTION

The National Institute of Health, defines asthma as a chronic inflammatory disorder of airways in which cellular elements play a major role particularly mast cell, T-lymphocytes, eosinophils, epithelial cells and neutrophils [1,2]. Asthma is an inflammatory disease that targets the airways narrowing and thereby resulting in the change of eosinophils, mast cell, lymphocytes and cytokine level. It is characterized by the exacerbation of coughing, dysponea, wheezing and chest tightness. The individual with asthma is well known to have high level of IgE that bind to the receptor of most cell and inflammatory products.

The interaction between antigen and antibody IgE result in the activation of inflammatory cellular reaction. Thereby releasing the mediator such as histamine, prostaglandins that ultimately lead to the contraction of airway smooth muscles [3-5].

Asthma can be triggered by various factors such as viral respiratory infections, certain chemicals, certain medication, airborne allergens, occupational sensitizers, smoke, air pollutant. Stress and anxiety or an extreme emotional arousal may also trigger asthmatic attacks. They are characterized into two important forms-

Extrinsic Asthma: It is caused by allergic response such as house dust, animal fur or various foods. Such cases account for about 10-20%.

Intrinsic Asthma: It is caused by the genetic, structural problems, infection. Both physiological and psychological. Such cases accounts for about 50-60% [6,7].

The pharmacological management of asthma largely depends on steroidal anti-inflammatory agents. There is no scientifically proven cure of asthma but it can be controlled by certain pharmaceutical drug or by some medicinal plants. Natural treatment of asthma are meant to be complement or an addition in the treatment of it [8].

During asthma attack the changes lead to stop air moving easily through airways, recurring symptom, reversible airflow obstruction, bronchospasm, It is characterized by airways inflammation cold cough, wheeze, chest tightness and dysponea. There are many herbs that are useful as pharmaceutical drug in the treatment of asthma.

Symptoms of asthma are not same for everyone. It includes: wheezing when exhaling, trouble sleeping caused by shortness of breath, chest tightness, coughing and pain on chest.

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Symptoms are worsened at night, in response to exercise and in early morning.

Causes of asthma

It is thought to be caused by environmental factor and genetic interaction. These factors influence its responsiveness and severity.

- **Environmental factor:** It includes cold air, allergen, smoke and chemicals.
- **Genetic factor:** Family history is a risk factor of asthma. If one identical twin is suffering from asthma, probability of other having same disease is approximately about 25%.

It has been estimated that 25 gene had been associated with asthma [9].

Medical condition: - Those who are suffering from eczema or hay fever is on high risk of developing asthma.

Diagnosis:-It can be diagnosed by

- **Physical examination:** Where your doctor check breathing with the stethoscope.
- **Breathing test:** Pulmonary function test measures airflow into and out of your lungs.
- **Spirometry: -**The device which measures the speed of air.

Asthma classification include:

- **Mild persistent:** The symptoms lasting more than two week but not daily .
- **Moderate persistent:** The symptoms occur daily.
- **Severe persistent:** The symptoms occur several times every day and mostly in nights (extremely worsen in night) [10].

Treatment of asthma

Asthma cannot be cured but it can be controlled by various pharmaceutical drugs can be used to quick relief but it may associate with certain side effects. Quick relief asthma treatment includes Bronchodilators (it can be taken as a nebulizer or inhaler, Anti-inflammatories, anticholinergics, biological therapy drugs) [11]. So, to overcome the side effects that associated with treatment of asthma medicinal plants/herbs are used in the combination. Some of the medicinal herbs are turmeric, *Ginkgo biloba, Allium sativum, Boswellia serrata, Piper longum, Lavandula officinalis, Clerodendrum*, *A. vasica, Aerva lanata.*

Some Important plants, which effective against asthma

Boswellia serrata

Boswellia serrata is also known as Indian frankincense it is a herbal plant which used in the treatment of asthma. The gum resin extract from *B. serrata* contains about 60% acetyl beta boswellic acid and 11 keto beta boswellic acid.

Boswellic acid has been evaluated for mast cell stabilizing activity and anti-anaphylactic using paw anaphylaxis and compound about 48/80 induced degranulation. It confirmed that ethanol extract of B.serrata possess anti-asthmatic activity [12].

Allium sativum

Allium sativum is commonly known as garlic. Garlic has been used for long time to prevent the disease like flu menstrual cramp, sinusitis, cold. It has been used herbal remedy for whooping, cough, bronchitis including asthma also. It can be used in the form of garlic capsule or tablet, garlic oil, garlic juice [13].

Piper longum

Piper longum is known as Indian longum or pepper usually used in dried form as spice. *P. longum* extract in milk reduced the cutaneous anaphylaxis in rats and protected the pig against bronchospasm.

The fruit showed anti-inflammatory activity against carrgenin induced rat paw edema. it shows a relaxant activity. Ethanol extract o*f P. longum* fruit and its component majorly piperine studied for their anti-asthmatic activity and immunomodulator activity [14].

Aerva lanata

The aerial part of the *Aerva lanata* was studied by using adult albino mice of either sex. *A. lanata* is rich in lupeol, flavonoids, alkaloids. The ethanol extract of *A. lanata* showed a anti-asthmatic, anti-microbial activity [15].

Echinacea angustifolia

E. angustifolia is commonly found in the western area, the constituent found in the plants are chicoric acid alkamides. It is used traditionally as a natural treatment of bronchitis and whooping cough. It possesses gingivitis, sinusitis and anti-asthmatic activity as well.

For the acute disorder and for serious chronic deficiency about 10 to 30 ml syrup can be given to the individual and for chronic disorder and infection prophylaxis about 10 to 40 ml dosage is prescribed. Dried herb tablet can also be used, can be taken 3 times in a day [16].

Lavandula officinalis

Its commonly known as lavender with soothing and calming effects. It is used to treat fungal infection and eczema. Lavender possesses an antibacterial and antiviral properties; it contains some volatile oil which have antiseptic value. Lavender can be used against some pathogenic bacterial strain such as *streptococcus* and *pneumococcus*. Lavender oil is used as chest rub, it is a natural treatment for relief of symptoms associated with asthma such as cold, chronic cough, tonsillitis, flu, pneumonia, bronchitis. Lavender oil to 2-3 cup of boiling water is used as inhale the vapors, lavender tea is also found effective against cold, cough [17].

Clerodendrum serratum

The root of *C. serratum* extract possess a antiasthmatic activity by employing a In vitro and In vivo in animal models, guinea pig is used in this model for to observed the antiasthmatic activity, phytochemical

screening exposed the presence ofsaponins,flavonoids,sterols the ethanol extract of root of plant *C. serratum* showed the consequential dose dependent antiasthmatic activity 200mg/kg [18].

Table 1: List of Medicinal plants used as anti-asthmatic agents

S. No.	Plant name	Plant parts used	Mechanism of action
1.	*Acanthus illicifolius*	Root	Anti-asthmatic, Anti-anaphylactic activity
2.	*Crinum jagus*	Root and bulb	Anti- asthmatic
3.	*S. xanthocarpum*	Herb	Bronchodilator
4.	*T. indica*	Whole plant	Bronchodilator, Membrane stabilizing
5.	*A. vasica*	Leaves	Bronchodilator, Anti-anaphylactic
6.	*Aconitum hetrophyllum*	Root	Cough, Asthma
7.	*Ricinus communis*	Leaves	Asthma, Cough
8.	*Saussurea ceratocarpa*	Whole plant	Bronchitis, Asthma
9.	*Solanum surratense*	Root, Berries, Fruit	Asthma, Cough
10.	*Thymus linearis*	Arial parts	Asthma, Cough
11.	*Trianthema portulacastrum*	Root	Asthma
12.	*Tylophora hirsuta*	Root, Leaves	Whooping cough and Asthma
13.	*Vitis vinifera*	Flower	Bronchitis

Olea europea

It is commonly known as olive plants, used as traditional medicine to prevent the disease. Specially leaves contain many antibacterial properties. It is a small tree with 12 to 20 feet high with grayish bark, rigid branches which contains bioactive compound against several disease, the ethanolic extract of ripe olive possess antiasthmatic activity by inhibiting clonidine [19].

Tamarindus indica

It is commonly known as Tamarind, which possesses a powerful anti-inflammatory property and help to ease pain and inflammation in respiratory tract and lungs. A Bark of this tree is very useful in the treatment of asthma and eye inflammation [20].

Tragia involucrate

It is commonly known as bichuti, it is a powerful medicinal plant which belongs to family Euphorbiaceae which has a powerful healing property related to respiratory tract. It heals polyps and inflammation, the notable effect of *Cuminum cyminum* and act as a powerful bronchodilator, the native place of cumin is Egypt and turkey, cumin is basically known as jeera and used as spice and it possess antimicrobial, antispasmodic activity, it also helps in digestion and absorption, it prevents respiratory tract problems and help to boost immune system also [21].

Cannabis sativa

It belongs to family cannabaceae, it acts as a bronchodilator and the major component is tetrahydrocannabinol [22].

Zingiber officinale

It is commonly known as ginger, which is found on SouthernChina, Malaysia and India is the largest producer of ginger, it attributes taste and aroma. It is a powerful in treating cold, cough, bronchitis. It contains some essential oils, gingerols and sesquiterpene hydrocarbon; it possesses antiviral, anti-inflammatory, anti-asthmatic activities [23].

CONCLUSION

The various medicinal plant which helps in the treatment of asthma has been discussed in this review. It includes plants, *Aloe Vera, crinum, Licorice, Adhatoda, Piper longum* these plants have found in disease control and possess antimicrobial activity. Some plants have been associated with two or three mechanisms of action depend on their bioactive compound present in the plants. It also found that different part of the plant contains different biomolecule which is used in the disease control. Some plants have various essential oils, plants are used in the control of various diseases such as asthma, there are many more plant which shown antioxidant, anti-inflammatory, anti-bacterial, anti-spasmodic, which can act as an anti-anaphylactic, bronchodilators. Some of the plants help to support nerve function and other nourish the lungs (airways) as well. These Plants are effectively work against asthma treatment and possess an anti-microbial effect.

This review emphasizes the need of herbal formulation to be used in the management of respiratory disease. The traditional method of treating asthma has been proved helpful as compared to pharmaceutical drugs, as the above-mentioned herbs/plants shown anti-asthmatic, anti-bacterial and anti-oxidant properties which help to manage the symptoms related to respiratory tract properly.

Conflict of Interest

None declared.

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REFERENCE

1. National Institute of Health, Expert panel report 2. Guidelines for the diagnosis and Management of asthma. NIH Publication. 1997;97-4051
2. Tatters field AE, Knox AJ, Britton JR, Hall IP. Asthma. Lancet. 2002;360:1313-1322.
3. Holgate ST, Polosa R. Treatment strategies for allergy and asthma. Nat Rev Immunol. 2008;8:218–230.
4. Donno DM, Bittesnich D,Chetta A, Oliveri D, Lopez vidriero MT. The effect of inflammation on mucocillary clearence in asthma. Chest.2000;118(4):1142-1149
5. Taur DJ, Patil RY. Some medicinal plants with anti-asthmatic potential. A current status. Asian Pac. J Tropical Biomed. 2011;1(5):413-418.

6. Tirtha SS:The Ayurvedic Encyclopedia. Natural Secrete of healing, prevention and longevity. Newyork: Ayurvedic Holistic Centre Press 2007;2407.
7. Ushasri S, Ranjith KJ, Sudha Bhargavi CH, Spoorthi L and Sai AP: antiasthmatic herbal Drugs-A Compilation. International Journal of Pharmaceutical and Chemical Sciences 2013; 2(1): 383-92.
8. Mali RG, Dhake AS. A review on herbal anti-asthmatics. Orient Pharm Exp. Med. 2011;11:77–90.9.
9. Morgenstem V. Respiratory health and individual estimated exposure to traffic-related air pollutants in a cohort of young children. Occup Environ Med 2007;64:8-16
10. Frey U, Brodbeck T, Majumdar A, Taylor DR, Town GI, Silverman M et al. Risk of severe asthma episodes predicted from fluctuation analysis of airway function. Nature. 2005;438: 667–670.
11. Blanc PD, Trupin L, Earnest G, Katz PP, Yelin EH, Eisner MD. Alternative therapies among adults with a reported diagnosis of asthma or rhinosinusitis: data from a population-based survey. Chest. 2001;120 (5): 1461–7.
12. Upaganlawar A, Ghule B. Pharmacological activities of *Boswellia serrata* Roxb.-mini review. Ethnobotanical leaflets. 2009;2009(6):10.
13. Awais A, Groom M, Sadler-Bridge D. Garlic-from nature's ancient food to nematicide. Pesticides News. 2009(84):18-20.
14. Zaveri M, Khandhar A, Patel S, Patel A. Chemistry and pharmacology of *Piper longum* L. International journal of pharmaceutical sciences review and research. 2010;5(1):67-76.
15. Kumar D, Prasad DN, Prakash J, Bhatnagar SP, Kumar D. Antiasthmatic activity of ethanolic extract of *Aerva lanata* Linn. Pharmacologyonline.2009;2:1075-1081.
16. Flora of North America, Narrow-leaved purple coneflower, black samson Echinacea, Echinacea angustifolia de Candolle in A.P.de Candolle and A.L.P.P.de Candolle, Prodr.5:554.1836
17. Silva GL, Luft C, Lunardelli A, Amaral RH, Melo DA, Donadio MV et al. Antioxidant, analgesic and anti-inflammatory effects of lavender essential oil. Anais da Academia Brasileira de Ciências. 2015;87:1397-408.
18. Bhujbal SS, Kumar S, Deoda RS, Kewatkar SM, Patil MJ. *In-Vitro* and *In-Vivo* Antiasthmatic studies of *Clerodendrum serratum* Linn in Guinea Pigs. IJPRD.2010;2(4):1-6.
19. Raman C, Subhash D, Vaibhav C. Evaluation of anti-histaminic activity ofaqueous extract of ripe olives of olea-europea. Journal of pharmacy Research. 2009;2(3):416-20.
20. Rivers MC, Mark J. *Tamarindus indica*. IUCN Red List of Threatened Species. 2017: e.T62020997A62020999. Retrieved May 1, 2020.
21. Bonini SA, Premoli M, Tambaro S, Kumar A, Maccarinelli G, Memo M et al. *Cannabis sativa*: A comprehensive ethnopharmacological review of a medicinal plant with a long history. Journal of ethnopharmacology. 2018;227:300-15.
22. SGrivennikov SI, Greten FR, Karin M. Immunity, inflammation, and cancer. Cell. 2010;140(6):883-99.
23. Mali RG, Dhake AS. A review on herbal antiasthmatics. Oriental pharmacy and experimental medicine. 2011;11(2):77-90.

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