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ROLE OF TROPICAL PLANTS IN ASTHMA MANAGEMENT

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ABSTRACT

Africa is endowed with a rich variety of plants. Most of the plants are used to treatment and manage diseases; thus, promoting good health. New plants are usually tried when observed that domestic animals feed on them without experiencing any visible discomfort. However, the use of traditional medicine has been neglected as soon as modern medicine began to flourish. As associated side-effects of synthetic drugs are increasingly being discovered, there is a need to explore the use of plant-based therapeutics in the management of diseases like hypertension, asthma and cancer that have resulted in huge loss of human resources and economic downturn. Therefore, two hundred reports of empirical studies on the application of tropical plants in the management of asthma were collected from credible online sources, organised, studied, and analysed. The results demonstrated the plants some of the plants studied exhibited anti-asthma properties using anti-inflammatory, anti-histamine responses, and antioxidant mechanisms, respectively. Hence, tropical plants possess certain bioactive compounds with anti-asthma effects. Objectively applied, tropical plants can be used to effectively prevent and manage asthma with minimal or no side-effects.

Keywords: Anti-asthma, Asthma, Phytochemistry, Phytomedicine, Tropical plants

INTRODUCTION

Asthma is a chronic inflammatory condition induced predominantly by allergies, it is characterized by airway hyper activity to a variety of stimuli largely of allergic origin with reversible airflow limitation. The main symptoms of asthma are wheezing, shortness of breath and cough (Fatokun et al., 2022). Its victims are forced to go through a fragile way of life which affects their ability to work and the intensity to which physical activities can be carried out.

There are speculations which surround the connecting link between environmental and genetic factors in asthma. It is considered to be a medical condition distinguished by three main abnormalities. These include: an airway blockage which is partially reversible, inflammation of the airway, and extreme sensitivity of the respiratory tract to a diversity of stimuli. However, the major cause of asthma seems to be related to immunity. Asthma appears to be caused by (IgE) antibodies which attach to mast cells in the mucosa of the airway and on re-sensitization to an antigen/trigger variable, interaction between the antigen and the antibody on the surface of the mast cell causes the discharge of facilitators already present in the cell granules in addition to the production and emancipation of other facilitators (Fatokun et al., 2022).

The goal of treatment when it comes to asthma is to achieve a symptom-free status while minimizing the risk for future occurrences. Modern medicines associated with the treatment of asthma include beta agonists, leukotriene modifiers and inhaled corticosteroids. Beta agonists adverse effects include tremor, increased nervousness, insomia in children, dyspepsia and allergy. Lekotriene modifiers has been assocaited with adverse efffects like trouble hearing, itchy skin, diarrhea and heart burn while corticosteriod's side effects include pedal edema, hoarseness , bruising and acne.

The practice of using plants for the prevention, treatment and management of diseases is described as phytomedicine. Phytomedicine deals with the isolation, extraction and purification of bioactive compounds from medicinal plants. Certain plants, which may also be called herbs, contain bioactive compounds or secondary metabolites such as flavonoids, terpenes, saponins, alkaloids, glycosides, *et cetera*, that could be aaplied in the management of diseases. Phytochemical tests or analyses are carried out on such plants and their bioactive compounds or secondary metabolites extracted. Such compounds are prepared in a similar way to modern medicines and are then used to carry out tests on subjects and the health development noticed is recorded.

MATERIALS AND METHODS

Five hundred reports on the use of tropical plants to prevent and manage respiratory tract dysfunctions were retrieved from online sources across differenct databases. No preference was given to either a specific or a group of specific databases(s). Two hundred empirical reports were selected from the initial five hundred on the bases of topical relatedness to asthma, clarity of report, standard methodology adopted, and source(s) of the plant(s) studied for detailed review. Finally, eighty-two articles were further analysed on the bases of ethnopharmacological validity. These eighty-two articles constitute the sources of the findings analysed in this review on the role of tropical plants in the management of asthma.

Brief history of phytomedicine

Phytomedicine is defined as herbal medicine with healing properties. Phytomedicine came into existence at the very beginning of human civilization. Archaeologists dates the use of medicinal plants to about 60000 years ago, which is traced back to the Paleolithic age, but the first written evidence of medicinal plants usage for preparation of drugs is credited to the Sumerians. The evidence contained some recipes for the

preparation of drugs which referred to over 250 plants (Zunic et al., 2017).

Another book known as a preliminary source of herbal medicine based on the usage of herbs is the Sheng Nong Herbal Book which dates back to about 3000B.C. It deals with the adaptation of the use of herbs of China. It contains the details of about 365 plants, animals and minerals that play a role in medicine (Yang et al., 2020).

People who were present in ancient periods began to employ herbs as a healing method against multiple ailments after gaining experiences from random trials and observation from animals. As stated earlier, wild animals have been observed to be able to discern accurately, plants that can relieve whatever discomfort they feel.

Table 1: Anti-asthmatic potential of some tropical plants

S/N	Tropical Plant Name	Parts Used	Country	Isolated/Identified compounds	Methods employed	Mode of action and main activity	Reference
1	*Adhata vasica*	Leaves	India	Vasicine, Vasicinone	In vitro	Bronchodialatory	Padhari et al., 2020
2	*Tylophora indica*	Leaves	India	Tylophorine, Tylophorinine, Tylophorinidine	In vitro	Anti-inflammatory, immunosuppresion	Cyrriac et al., 2020
3	*Euphorbia hirta*	Flower	America	Myricitrin Quercitrin	In vivo	Anti-inflammatory	Truong et al., 2010
4	*Curcuma longa*	Rhizome or stem	India, tropics	Curcumin	In vivo	Anti-inflammatory	Xie et al., 2020
5	*Solanum xanthocarpum*	Seed	India, tropics	Campesterol, Diosgenin,Solasonine	In vitro	Anti-inflammatory	Karami-Mohajeri et al., 2022.
6	*Clerodendrum serratum*	Roots	India	Hispudilin, Oleanolic acid, Cleroflavone	In vitro	Anti-inflammatory	Gökbulut, 2016,
7	*Piper longum*	Fruit	India, Sri Lanka, Middle East and America	Piperine	In vivo	Anti-inflammatory	Qurashi et al., 2009, Bui et al., 2017
8	*Inula Racemosa*	Roots	Himalayan region	Eudesmol	In vivo and in vitro	Bronchodilatory	Britto et al., 2012
9	*Zingiber officinale*	Rhizome	India, China, Nigeria, Jamaica	Gingerol	In vivo	Anti-inflammatory	Khan et al., 2015
10	*Tinospora cordifolia*	Stem	Nigeria, India, Bangladesh	Choline	In vitro	Anti-inflammatory	Mimmi et al., 2014
11	*Plectranthus barbatus*	Root and Leaf	Nigeria	Forksolin	In vivo	Bronchodilatory, Anti-inflammatory	Loftus et al., 2015
12	*Aegle marmelos*	Fruit	Nigeria, India, Sri Lanka	Marmesolin	In vitro	Bronchodilatory	Pynam & Dharmesh 2018, Monika et al., 2023
13	*Terminalia belerica*	Fruit	Thailand, Nigeria	Beta-sitosterol, Gallic acid	In vitro	Bronchodilatory, anti-spasmodic, anti-inflammatory	Nikita, 2018, Alfei et al., 2020
14	*Allium sativum*	Root bulb	Europe, Asia and Africa	Allicin	In vivo and in vitro	Anti-inflammatory, Anti-oxidant	Metwally et al., 2016
15	*Sida cordifolia*	Leaves	Nigeria, China, Brazil	Ephedrine	In vivo	Bronchodilatory	Iqbal et al., 2022
16	*Hygrophilia auriculata*	Leaves	India, Sri Lanka, Thailand,	Lupeol, Beta-sitosterol	In vivo	Anti-inflammatory	Itoh et al., 2014, Nikita, 2018

Challenges associated with the use of tropical plants with anti-asthmatic potential

As much as tropical plants with anti-asthmatic potential offer medicinal properties, they still possess a few disadvantages which includes side effects, accessibility, and challenges associated with standardization for medicinal use (Saini et al., 2022).

Tropical plants with anti-asthmatic potential exert a number of side effects. This is quite the norm across medicinal plants as they all have the potential to exert both pharmacological and toxicological effects. These side effects may be life threatening and may vary from individual to individual (Usmani et al., 2023).

The plants mentioned above have their individual side effects and some of them exert effects common to another plant. Some of the side-effects felt may include abdominal pain, diarrhoea, heartburn, vomiting, nausea, headache, skin irritation or even allergic reactions and many more.

Standardization of the plant extracts may be affected by conditions such as variability in climate including climate change, soil conditions and even genetic factors in plants, these can lead to inconsistent bioactive compound levels which as earlier mentioned is responsible for the therapeutic activities carried out by the plant. Another factor affecting its standardization can be the traditional preparation method for extraction, which could affect its quality through the introduction of contaminants or adulteration may occur in the process of preparation (Imam et al., 2016).

The availability and accessibility of the plants may also be a disadvantage or rather a limitation faced. While some of the tropical plants are common and easily found such as *Z.officinale* (ginger) and *C. longa* (turmeric), many of them are not easily found or are very rare (Sudhakaran et al., 2018).

There may also be stigmatization associated with the use of tropical plants that is, there may be poor perceptions and attitudes towards their use.

Future perspectives

Challenges associated with using plants with anti-asthmatic potential due to side effects may be combated when regulations and policies are fully implemented to ensure that the drugs extracted meet up with the standard requirements and are safe for use. The plants and their products should only be used after it has been screened and approved by the appropriate agencies.

In order to curb wrong or adulterated preparations of such medicines, there should be an upgrade in the tools and equipment used in their preparation, such as a transitioning from clay materials to iron pots and sterilised utensils. This will help to prevent release of unsafe plants products for communal use.

Stigmatization associated with the use of traditional medicine could also be reduced through endorsements, interest or involvement of standard scientifically oriented professionals such as pharmacists, doctors, chemists, toxicologists, biochemists, etc. This may help to debunk false impressions concerning traditional medicine. The involvement these professionals could lead to the combination of modern and traditional medicine when managing with chronic ailments such as asthma.

CONCLUSION

In conclusion, the research on tropical plants in asthma management shows a promising path for alternative and complementary approaches to modern treatments. These plants contain a wide array of bioactive compounds which shows their potential in attenuating symptoms and resolving underlying inflammation. While these plants need to go through more scientific study to establish their efficacy and safety, the rich traditional knowledge surrounding these treatments cannot be ignored. Integrating tropical plants into asthma management treatments could lead to a more extensive and specific approach, giving individuals that are not as financially capable or those who are not willing to go through the side effects brought about by the modern treatments, a wider variety of options to enhance or improve their respiratory function. As we go through the difficulties of asthma care, the collaboration between traditional wisdom and modern treatment opens up new directions for therapeutic care, helping to facilitate a more comprehensive understanding of the role of nature in respiratory care.

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