Journal of Advanced Zoology
ISSN: 0253-7214
Volume 43 Issue 1 Year 2022 Page 1275 - 1279

Antiasthmatic Efficacy Of Ethanolic Leaf Extract Of *Fagonia Arabica Linn* On Isolated Guinea Pig Tracheal Chain Preparation

Sujata V. Lambe[1*], Govind Soni[2]

[1*]*Research scholar, Oriental University, Indore, (M.P.) 453555*
[2]*Asso. Prof. Oriental university, Indore, Madhya Pradesh 453555*

***Corresponding Author:** Sujata Vitthal Lambe*
**Research Scholar, Oriental University, Indore, Madhya Pradesh 453555, Email: sujatalambe88@rediffmail.com*

Abstract

Aim and objective: The study was aimed to investigate anti-asthmatic activities of ethanolic extract of *Fagonia Arabica* by in vitro models. Traditionally, plants have been reported to be antiasthmatic but not evaluated, so the objective is to perform it.
Materials and Methods: Acute toxicity studies of *Fagonia Arabica Linn* were performed. Guinea pigs were screened out and divided into control, standard, and FAEE-treated groups. Anti-asthmatic activity of FAEE was assessed by in vitro guinea pig tracheal chain method.
Results: The antiasthmatic activity of the extracts 10, 20, 30, 40, and 50 µg/ml was evaluated in guinea pig trachea chain-isolated preparations by using standard drugs Acetylcholine and histamine, respectively. The extract pointed reserved all the reactions produced by the inflammatory intermediaries used, and extreme significant anti-asthmatic activity was observed at the doses of 30 µg/ml.
Summary: Preliminary phytochemical analysis showed plants contain alkaloids, flavonoids, terpenoids, saponins, tannins, coumarins, sterols, and glycosides in different polar and nonpolar extracts of plant material. Ethanolic extract of *F.A*. Leaves show antiasthmatic activity in an in vitro model.
Conclusion: The results of the study exposed the anti-asthmatic activities of F. Arabica, which provides its further consequence for the treatment of cough variant asthma.

Keywords: acetylcholine, aminophylline, Broncho protection, histamine, Fagonia Arabica Linn.

Introduction:

Asthma is one of the most common diseases characterized by inflammation of the airways. It can be caused by various factors such as allergens, drugs, respiratory infections, dust, cold air, physical exertion, emotions, work stimuli, chemicals, histamine, etc. Asthma comes from a Greek word meaning "to breathe" or "to breathe." It is a bronchial disease that usually manifests as wheezing, shortness of breath, and cough, especially in children (Holgate ST, 2008). Asthma is an allergic response that induces inflammation and narrowing of the airways, causing spasms and difficulty breathing (Donno DM et al., 2000). Asthma is a chronic lung disease that occurs frequently in children and adults in economically developed and developing countries. Its prevalence and severity are increasing, especially in allergic patients (CDC, 2011). Asthma occurrence (the people who have

ever been identified with asthma and still suffer from it) increased from 7.3% in 2001 to 8.4% in 2010. In 2010, an estimated 25.7 million people had asthma, 18.7 million adults aged about 18 and over, and 7.0 million children aged about 0–17 years (Akinbami LJ, 2012). Asthma is a chronic respiratory disease that affects a large part of the world's population. Allergen-induced bronchial exacerbation results in a rapid initial immunoglobulin E (IgE)-mediated decrease in bronchial airflow (forced expiratory volume in 1 second), followed by a late-phase IgE-mediated response in which bronchial airflow is reduced by 4–8 hr. Asthma is initially characterized by the presence of several inflammatory mediators, such as eosinophils, neutrophils, lymphocytes, and plasma cells, in bronchial tissues, bronchial secretions, and mucus. Cross-linking of IgE molecules by the allergen causes mast cells to degranulate, releasing histamine, leukotrienes, and other mediators that propagate airway inflammation. The majority of asthma medications currently available either relax bronchospasm (bronchodilators) or reduce inflammation
(corticosteroids). Although these treatments are available, they are ineffective at curing asthma completely because they have numerous harmful side effects (Goodman and Gillman, 2006). According to Ayurveda, herbal plants are more effective and have relatively lower toxic values. In addition, they are less likely to cause patients' side effects and complications than current synthetic drug therapies. The Indian Materia Medica claims that the herbal remedy *Fagonia Arabica Linn* has antihistaminic properties (Srinivas K et al., 2000; Vikrant Arya et al., 2011). It had an impact on mast cell degranulation, inflammatory cells like leucocytes and eosinophils, and bronchospasm and inflammation brought on by histamine. These criteria proved useful in assessing the antiasthmatic activity of *Fagonia Arabica Linn* using experimental animals like guinea pigs. (Khare CP, 2007).

Materials and methods

Animal:

Guinea pigs (weighing between 200 and 500 grams) of either sex were made available in the animal house of SMBT College of Pharmacy Dhamangaon Tal. Igatpuri Dist. Nashik (MS). The animals were kept in carefully controlled environments with a 12h/12h light-dark cycle, a temperature of 22°C, and a humidity of 55°C. The animals had been fed a regular pellet diet and had access to water. The Institutional Animal Ethical Committee (IAEC) of SMBT College of Pharmacy, Dhamangaon, Tal. Igatpuri Dist. Nashik (MS) gave its approval to the study. All phases of the experiment were conducted in strict accordance with ethical standards. A model for preparing the tracheal chains of guinea pigs was used in the study. The isolated trachea was placed in a Kreb's solution-filled organ bath that was 30 ml in size, kept at 37°C, and gassed with air. The bath solution was changed every 10 minutes during the 45-minute equilibration period for the tissue. After the equilibration period, histamine initially caused contractions, which were then followed by acetylcholine (100 g/ml) and the extract effect (up to 50 g/ml). One minute of drug-tissue contact time was maintained. On a smoked paper recorder, responses were captured.

Plant material:

The fresh leaves of *Fagonia Arabica Linn* were collected locally in the month of July and authenticated by Prof. Dr. P.E. Jagdale, Head, Department of Botany, Arts, Science & Commerce College, Rahuri, Dist. Ahmednagar vide letter no. 35/2021-2022 dated 14/7/2021. After certification, the leaves are dried to remove moisture. The sheet was size-reduced to obtain the desired particle size of the meal. 200 g of dry powder was taken and defatted with petroleum ether. The defatted material was extracted with ethanol in a Soxhlet apparatus below 50 °C. Extraction was carried out for 18–20 hours. The plant material was then removed from the Soxhlet apparatus and dried until the ethanol had evaporated. Ethanol extracts were stored in a refrigerator until use. (Das et al., 2011)

Preliminary phytochemical screening:

1.Alkaloids:

Mayer's test: Formation of a yellow cream precipitate indicated the presence of alkaloids.
Wagner test: The formation of a brown or reddish-brown precipitate indicated the presence of alkaloids.
Dragendorff's test: The formation of a red precipitate indicated the presence of alkaloids.
Hager test: The formation of a yellow precipitate indicates the presence of alkaloids.

2.Flavonoids:

Shinoda Test: The pink or red color of the solution indicates that the drug contains flavonoids. Triterpenoids:

Libermann-Buchard test: A dark green color of the solution indicated the presence of steroids, and a dark pink or red color of the solution indicated the presence of triterpenoids (Kokate CK, 2004).

In vitro models:
Histamine and acetylcholine-induced contractions on isolated Guinea pig tracheal chain preparation: Guinea pigs were stunned by a quick hit to the head before being killed by severing blood vessels in their necks. Place the trachea in a Petri dish and quickly separate it from the surrounding tissue. Fill it with oxygenated Krebs solution (NaCl - 114.0 mM; CaCl2 - 2.5 mM; KCl - 4.7 mM; glucose - 11.7 mM; NaHCO3 - 25 mM; MgCl2 - 1.2 mM; KH2PO4). The trachea was divided into 12 rings of approximately equal width and fastened with short loops of silk thread. Tracheal chains were hung in organ tubes containing 20 mL of Krebs solution and equilibrated at a constant tension of 500 mg. At 37 ± 10 °C, bathing solutions were bubbled with 95% oxygen and 5% carbon dioxide. The tissues were allowed to equilibrate for 30 minutes. Her PSS on the organ bass changed every ten minutes. Histamine and acetylcholine responses were measured using student physiography (Bio Devices) and an isotonic transducer. Interactions between the effects of medicinal extracts and contractile responses have been observed (Vogel HG, 2008; Kulkarni S, 2005).

Evaluation:
The test drug EEFA reduced contractions caused by spasmogens such as histamine and acetylcholine. The percentage inhibition of acetylcholine and histamine-induced contraction was assessed.

Results:

Histamine (30µg/ml) and acetylcholine (20µg/ml) were introduced to an organ bath, and contractions were measured based on their dose. The adjusted physiological salt solution containing Fagonia Arabica Linn 100µg/ml extract significantly decreased the contractile action of histamine (46.8±0.96) and acetylcholine (34.25±0.79) as compared to the control group (62.2±0.72) and (63.05±0.27), respectively. The methanol extract of Fagonia Arabica Linn caused an identical side shift in the dosage response curves of histamine and acetylcholine.

Discussion:

A significant fraction of people globally suffer from asthma, a chronic respiratory condition. An acute immunoglobulin E (IgE)-mediated reduction in bronchial airflow (forced expiratory volume in 1 second) is the result of allergen-induced bronchial discomfort. This is followed by a 4-second reduction in bronchial airflow in late IgE, which is followed by a reaction over the course of 8 hours. Increased levels of eosinophils, neutrophils, lymphocytes, and plasma cells in bronchial tissue, bronchial secretions, and mucus are indicative of early-stage asthma. Allergens that cross-link his IgE molecules trigger mast cells to degranulate, releasing mediators such as histamine and leukotrienes that sustain airway inflammation. The medications typically used in modern medicine to treat this illness are inadequate because they simply relieve symptoms, have a number of negative side effects, and may eventually lose their effectiveness. The most common side effects of β2 include muscle tremor and hypokalemia. Theophylline has a limited therapeutic index and necessitates medication monitoring. Corticosteroids have several side effects, including fluid retention, increased cell mass, increased hunger, weight gain, osteoporosis, capillary fragility, hypertension, peptic ulcers, diabetes, cataracts, and psychosis. As a result, there is a need to identify better antiasthma medications. The plant *Fagonia arabica* researched in this study comes from the *Zygophila* family and contains chemical elements such as alkaloids, flavonoids, and triterpenoids that are thought to have antioxidant properties. Ayurveda believes that Arabica can help with bronchial asthma. As a result, the anti-asthmatic properties of ethanol leaf extract were investigated in this study. An in vitro model was used to demonstrate anti-asthmatic activity by inducing contractions on isolated guinea pig tracheal chain preparations with histamine and acetylcholine. Histamine-induced bronchoconstriction is an established immunological model of antigen-induced airway blockage. Bronchial asthma is defined by an enhanced sensitivity of the airways to proconvulsants. Antispasmodics, which include beta-adrenaline, xanthine derivatives, and anticholinergics, are used to relax airway smooth muscle and quickly treat acute asthma attacks. Beta-adrenergic agonists stimulate beta-adrenergic receptors on airway smooth muscle, resulting in bronchodilation and relaxation. Certain beta-2 agonists, like salbutamol and salmeterol, have long been used to treat asthma symptoms. In guinea pig trachea, *F. Arabica* ethanol extract suppresses contractile responses brought on by spasmogens such as histamine and acetylcholine. This implies that by blocking both histamine and muscarinic receptors, EEFAs have strong antispasmodic actions. Steroids

make up the majority of asthma treatments. The phytochemical profile of the plant reveals the presence of several saponin glycosides, alkaloids, flavonoids, and steroidal nuclei in the form of triterpenoids. These compounds might be the cause of plants' anti-asthma action. To identify and describe the active component exhibiting anti-asthma activity, more study and research are necessary to support this claim.

Conclusion:

The existence of alkaloids, flavonoids, steroids, triterpenoids, and saponins in the *F. Arabica* L. plant was confirmed by a number of chemical and physical tests. Administration of an ethanolic extract of *F. Arabica* also markedly reduced contractions generated by histamine and acetylcholine in guinea pig tracheal chains. Therefore, in anti-asthmatic models, ethanolic extract of *F. Arabica* exhibits noteworthy anti-histaminic, bronchodilator, and antiinflammatory properties. We may conclude that *F. Arabica* ethanolic extract has strong antiasthmatic properties overall.

Conflict of interest
The authors declare that they have no conflict of interest.

Ethical approval
Necessary approval and ethical clearances were taken from the Institutional Ethical Committee of the Institute (Ref: IAEC/Per/2022/PP-IAEC/2022-50) on the use and care of experimental animals before conducting any of the experiments. All experiments performed on animals complied with the Guide for the Care and Use of Laboratory Animals and ARRIVE guidelines.

Funding sources
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability
All data generated and analyzed are included within this research article.

References:

1. Akinbami LJ, Moorman JE, Cathy Bailey, Zahran HS, Michael King, Johnson CA, Xiang Liu. Trends in Asthma Prevalence, Health Care Use, and Mortality in the United States, 2001–2010, NCHS Data Brief, No. 94, May 2012.
2. Armitage AK, Boswood J, Large BJ. Thioxanthines with potent bronchodilator and coronary dilator properties. Brit J Pharmacol Chemother. 16, 1961, 59-76. Centers for Disease Control and Prevention, National Asthma Control Program, July 11, 2011.
3. Das BK, Das B, Arpita FK, Morshed MA, Uddin A, Bhattacherjee R, Hannan JMA. Phytochemical screening and antioxidant activity of leucas aspera. Int J Pharm sci research. 2(7), 2011, 1746-1752.
4. Donno DM, Bittesnich D, Chetta A, Olivieri D, Lopez-Vidriero MT, The effect of inflammation on mucociliary clearance in asthma. Chest. 118(4), 2000, 1142-1149. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma (EPR august 28, 2007). NIH Publication No. 07-4051.
5. Bethesda, MD: U.S. Department of Health and Human Services; National Institutes of Health; National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program, august 28 2007. Goodman and Gillman, The pharmacological basis of therapeutics, chapter 27: pharmacotherapy of asthma, The McGrawHill Companies, 11th ed., 2006.
6. Holgate ST, Polosa R, Treatment strategies for allergy and asthma. Nat Rev Immunol. 8, 2008, 218-230. Jignesh patel, et al. Evaluation of the antiasthmatic activity of leaves of Vitex Nigundo. ajpcr. 2(1), 2009, 81-86.
7. Khare CP. Indian medicinal plants, An illustrated dictionary, Springer publication, 2007, 372.
8. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy, 42nd Ed, Nirali prakashan, 2004, 13.30-13.32. Kulkarni SK. Handbook of experimental pharmacology, 3rd ed., vallabh prakashan, 2005, 92-93.
9. Norton S, Quantitative determination of mast cell fragmentation, British J Pharmacology. 9, 1954, 494-494.
10. Sheth UK, Dadkar Nk, Kamat Ng, Selected topics in experimental pharmacology, Kothari book depot, Bombay, 5, 1972, 63.

11. Srinivas K, Rao MEB, Rao SS, Anti-inflammatory activity of heliotropium indicum linn. and leucas aspera spreng. In albino rats. Indian journal of Pharmacology. 32, 2000, 37-38.
12. Taur DJ, Nirmal SA, Patil RY, Karma MD. Antistress and antiallergic effects of Ficus bengalensis bark in asthma, Nat Prod Res. 21, 2007, 1266-1270.
13. Vikrant A, Vivek KG, Ranjeet K. A review on plants having anti-arthritic potential. Int J Pharmaceut Sci Review and Research. 7(2), 2011, 132-136.
14. Vogel HG. Drug discovery and evaluation, Pharmacological Assays, 3rd ed., 2008, 511 -547.
15. Yue D, Jun-Ping K, Lian-Hua L. Anti-allergic effect of an aqueous extract of Wu-Hu-Tang. Journal of Ethnopharmacology, 5(2), 1997, 127-132.