Int Pharm Sci (2026) Vol 19 (1)

Internationale Pharmaceutica Sciencia

journal homepage: https://ipharmsciencia.edwiserinternational.com/home.php

Original Article

Development & Evaluation of Multi-Herbal Tea with Anti-Asthmatic Properties

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ARTICLE INFO

Received: 27 February 2026
Revised: 26 April 2026
Available Online: 30 April 2026

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ABSTRACT

Asthma is a chronic disease characterized by obstruction, nonspecific bronchial hyperreactivity, inflammation, and airway remodeling. While modern anti-asthmatic drugs are widely available, they have drawbacks such as side effects and cost variations, which can hinder treatment adherence. A review of the literature highlights the potential of traditional herbal medicines as an alternative for asthma management. However, many communities are hesitant to use these due to the lack of established mechanisms of action regarding their anti- asthmatic potential. Ajowain seed, kalaonji, tulsi, triphala, vasaka leave, mulethi root and clove were the major herbal ingredients. All ingredients were finely powdered using sieve mesh no. 80. The formulation produced which entailed properly mixing all of the formulation using a geometrical method with variable powder weight, were evaluated for different parameters which included organoleptic, angle of repose, bulk density, tapped density, dust leak and Evaluation of extractive matter. All formulations from F1, F2, F3 and F4 were created. The findings corroborated the herbal tea quality, safety and usability. Formulation F3 was chosen as the best option across all studies, demonstrating best results in different evaluation parameters. Additional research and development routes be pursued to investigate its prolonged performance and effectiveness.

Keywords: *Herbal Tea; Ajowain; Kalaonji; Tulsi; Triphala; Mulethi; Vasaka; Anti-asthmatic activity.*

Introduction

Herbal medicine is the fulcrum of complementary and alternative medicine, which has recently gained significant appeal around the world and is progressively being integrated into the conventional healthcare system. The use has gained great acceptance around the world, and it is progressively being integrated into mainstream healthcare systems. The use of HM crosses gender, social, and racial lines in both developing and developed countries around the world. Due to the growing popularity of HM, stakes in global markets are fast increasing, and yearly sales are quickly nearing US $62 billion. Low cost, universal acceptability due to its status as a natural substance, and acclaim are all major factors driving this increase in consumption and use. [1] Throughout history, humans have relied on nature to meet their basic needs, such as medicines, shelter, food, scents, clothing,

flavors, fertilizers, and modes of transportation. The plants continue to provide us with new remedies. [2,3]

In local or regional healing practices, traditional herbal medicines are naturally occurring, plant- derived drugs that have undergone little to no industrial processing and have been utilized to cure illness.

Asthma is a chronic, obstructive, and reversible lung illness characterized by inflammation and narrowing of the bronchial lumen, as well as a hyperactive reaction to particular stimuli resulting in wheezing, dyspnea, and chest tightness. It is a chronic ailment, which means it does not go away and requires continual medical treatment. The majority of people are diagnosed with one of two forms of asthma. The diagnosis is made based on the patient's medical history, the severity of the symptoms, and disease control measures.

Intermittent asthma: This is detected when asthma symptoms appear and then subside. People with intermittent asthma may be able to breathe properly in between episodes of symptoms.

Persistent asthma: This is recognized when symptoms occur frequently. They may be mild, moderate, or severe.

Asthma can be diagnosed based on the age when symptoms first appear or what triggers symptoms.

Childhood asthma: Some children may develop asthma as infants or babies. Many others are diagnosed before the age of five, when their lungs are still developing.

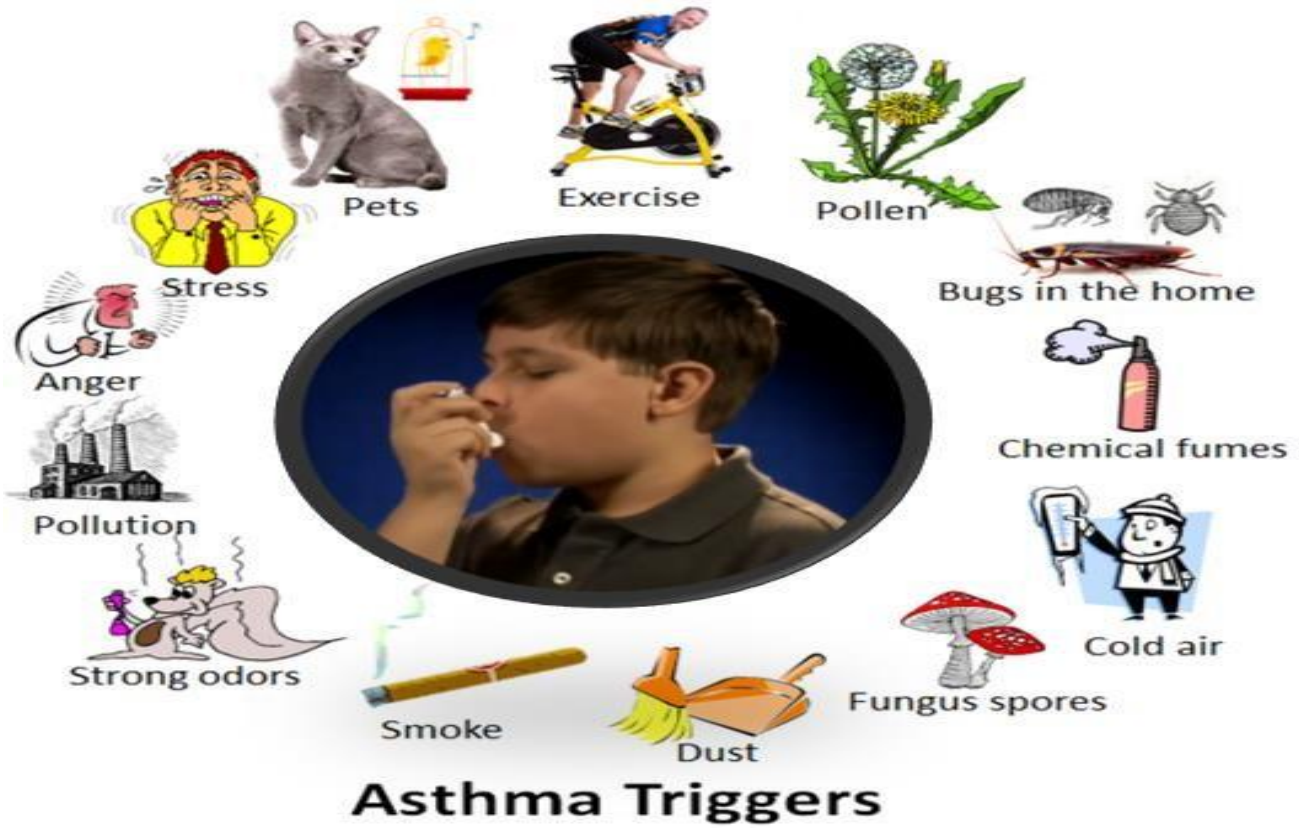

Figure 1: Childhood asthma structure.

Asthma is a common chronic inflammatory illness characterized by reversible airflow restriction, airway hyperresponsiveness, and airway remodelling. This disease has a tremendous influence on people, families, and society. It is also affected by variations in the numbers of eosinophils, mast high amounts of particular IgE that binds to receptors of mast cells and other inflammatory cells. The interaction between IGE antibody and antigen activates a cascade of inflammatory cellular reactions, including the production of mediators such as histamines, prostaglandins, and leukotrienes, which leads to airway smooth muscle contraction and bronchoconstriction. [4-7]. The name "asthma" is derived from the Greek for "to breathe hard." The Global Initiative for Asthma was established to raise awareness of asthma among health professionals, public health officials, and the general public in order to promote prevention and management through a coordinated global effort [8-12]. According to the GINA guidelines' final version in November 2006, bronchial asthma is clearly characterized as a chronic inflammatory condition of the airways involving many cells and cellular components. Chronic inflammation is related with airway hyperresponsiveness, which causes recurring episodes of wheezing, dyspnea, chest tightness, and

coughing, especially at night or early in the morning. [13-15] The aim of the present study is to develop and evaluate a multi-herbal tea with anti-asthmatic properties.

Material and Methods

Table 1: List of ingredients and its role.

S. No.	Ingredients	Role
1	Vasaka leaves	A decoction of the leaves of Vasaka may be used to help with cough and other symptoms of colds
2	Tulsi leaves	Tulsi supports respiratory health, so it's especially helpful for fighting colds, flus, and allergies. Because it helps clear out the lungs, tulsi is also great for eliminating bad breath.
3	Kalonji seeds	Kalonji is known to remove excess mucus from the lungs by reducing the symptoms of asthma.
4	Cloves	Cloves possess antibacterial and antiviral properties that can combat the underlying causes of respiratory infections, potentially providing relief from coughing fits.
5	Triphala	Triphala also contains ellagic acid which has been shown to reduce histamine release and inflammation in the lung via suppressing the activity of NF-κB, and these effects help speed up the resolution of allergic airway inflammation.
6	Mulethi	Mulethi, consumed in any composition, assures broad benefits and relief from cough, cold, sore throat and throat infections.
7	Ajwain seeds	The active compounds in ajwain have bronchodilator properties, which means they can help to widen the airways and reduce bronchial congestion.

All the herbal medicine including (vasaka leaves, tulsi leaves, kalonji seeds, clove, triphala, mulethi roots & ajwain seeds) was from the herbal garden of Nibha Institute of Pharmaceutical Sciences. The plant was further confirmed by Ms. Jyoti Mala Sinha, HOD, Department of Pharmacognosy and Phytochemistry, Nibha Institute of Pharmaceutical Sciences, Rajgir. After conformation the collected samples were washed and dried properly.

Method of Preparation

Two different formulation were prepared with varying quality/concentration of all ingredient named F1, F2, F3 and F4 to obtain uniformly sized particles, all powdered material was passed through a sieve with a mesh size of 80, 10 and 22 followed by accurate weighing furthermore, all powder ingredient were geometrically combined to ensure consistent and even mixing table 2 shows the formula for preparing individual preparations with each ingredient. The individual preparation was stored in an airtight container, labelled as previously stated with the composition incorporated, and used for addition evaluation studies.

Table 2: Formulation table of anti-asthmatic tea.

S. No.	Ingredient	Scientific name	Weighs			
			F1	F2	F3	F4
1	Vasaka leaves	Adhatoda zeylanica medik	10 g	10 g	10 g	10 g
2	Tulsi leaves	Ocimum tenuiflorum	10 g	10 g	10 g	10 g
3	Kalonji seeds	Nigella sativa L.	10 g	10 g	10 g	10 g
4	Cloves	Syzygium aromaticum	10 g	10 g	10 g	10 g
5	Triphala	Emblica offcinalis, Terminalia bellirica, Terminalia chebula.	10 g	10 g	10 g	10 g
6	Mulethi root	Glycyrrhiza glabra	10 g	10 g	10 g	10 g
7	Ajwain seeds	Trachyspermum ammi	10 g	10 g	10 g	10 g
8	Stevia	Stevia rebaudiana bertoni	0	0.1	0.3	0.5

Evaluation of Anti-Asthmatic Herbal Powder

Organoleptic (Visual Appearance) Characteristics

Organoleptic evaluation for parameters like colour, odour, taste and texture was carried out. Colour and texture were evaluated by vision and touch sensation respectively. For taste and odour evaluation a team of five taste and odour sensitive persons were selected.

General Powder Characteristics

General powder characteristics includes evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria etc.) of the preparation, Characteristics evaluated under this section are particle size, angle of repose, bulk density and tapped density. All the seven herbal powders were taken at four different level i.e., from top, middle and lower level for the evaluation.

Particle Size

Particle size is a parameter, which affect various properties like spread ability, grittiness etc., particle size was determined by sieving method by using I.P. Standard sieves by mechanical shaking for 10 min.

Angle of Repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow

Funnel method: Required quality of dried powder is taken in a funnel placed at a height of 6 cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder was noted and recorded the angle of repose (θ) can be calculated by using the formula.

Open – ended cylinder method: Required amount of dried powder is placed in a cylindrical tube open at both ends is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap is noted and recorded. For the above two methods, the angle of repose (θ) can be calculated by using the formula.

$\theta = \tan -1 (h / r)$

Bulk density

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Required amount of the powder is dried and filled in a 125 ml measuring cylinder up to 125 ml mark. Then the cylinder is dropped onto a hard wood surface from a height of 1 inch at 2 second intervals.

The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values. The Bulk Density is calculated by using the below given formula.

Bulk Density = weight of dry solid (g) / volume of dry powder (cm^3)

Tapped density

The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 min and volume, or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimeter (g/cm^3).

Tap Density (Pt) = weight of powder (M) / Minimum volume occupied after tapping (V_t)

Hausner's ratio

Hausner's ratio is an indirect index of ease of powder flow. It is calculated by the following formula:

Hausner's Ratio = Tapped density / Bulk density

Dust leak

Dust leakage problem, which is one of the most common problems in dust collection and filtration systems, is the leakage of the dust and particles out of the clean air chamber. In case of dust leakage, unwanted dust comes out from the fan discharge.

Friability test = w_1- $w_2/w_1 \times 100$

Evaluation of extractive matter

Extractives are the natural chemical products of biomass that are capable of being extracted by some solvents. It comes under physical parameter of the drug evaluation. It helps to indicate the nature of chemical constituents present in the drug. Three type of extractive matter

i. Alcohol soluble extractive
ii. Water soluble extractive
iii. Ether soluble extractive

% of water soluble extract = weigh of residue / weight of drug × 100.

Result

The present formulation of herbal anti-asthmatic powder was formulated in such a way that it should have unique property to reduce all the deficiencies in order to fulfill and provide all the vital nutrients in the body.

Organoleptic Property: All the formulations was found to be light browning upon mixing with boiling water, the taste of all formulation was sweet however the formulation with stevia leaves were better in taste. The odour of all the formulations was pleasant.

pH: pH is one of the most important factors involved in the formulation. The pH was measured and the result has been tabulated in the below table 3.

Table 3: PH value of the herbal anti-asthmatic powder.

S. No.	Formulation	pH value
1	F1	7.2
2	F2	7.18
3	F3	7
4	F4	7.68

Angle of Repose

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow. It is done by funnel method and Open cylinder method. The result of the particular evaluation is tabulated in the below table 4.

Table 4: Angle of repose for the herbal anti-asthmatic powder.

S. No.	Formulation	Angle
1	F1	0.393
2	F2	1.066
3	F3	1.052
4	F4	1.118

Bulk density

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Bulk density of the developed formulations were evaluated according to the procedure as discussed earlier and the result of the particular evaluation is tabulated in the below table 5.

Table 5: Bulk density for the herbal anti-asthmatic powder.

S. No.	Formulation	Bulk density
1	F1	0.393 g/ml
2	F2	0.357 g/ml
3	F3	0.362 g/ml
4	F4	0.364 g/ml

Tapped density

The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. The result of the particular evaluation is tabulated in the below table 6.

Table 6: Tapped density for the herbal anti-asthmatic powder.

S. No.	Formulation	Tap Density
1	F1	0.49 g/ml
2	F2	0.55 g/ml
3	F3	0.5154 g/ml
4	F4	0.5102 g/ml

Dust leak

Two tea bags of the herbal tea were selected at random, weighed and placed in a friability tester. The machine was operated for 4 min to undergo the abrasive fall. After the expiration of the 4 min, the tea bags were dusted and weighed.

$W_1 = 2.89$ g $W_2 = 2.78$ g

Friability test = $w_1 – w_2 / w_1 \times 100 = 3.80$ %

Evaluation of extractive matter

A tea beg corresponding to 5 g of the herbal tea was brewed using 250ml of boiling potable water. The water containing the tea beg was allowed to stand for 24 h with intermittent stirring. A 20 ml quantity of the brew was transferred into a pre-weighed porcelain dish was then transferred into a hot air oven set at 50 o C and allowed to stay for 1 h. the percentage of the soluble extractive matter was calculated with reference to the dry weight of the sample without the empty bag.

% of water soluble extract = weight of residue / weight of drug × 100 = 1.60 %

Conclusion

Derived from plant sources, anti-asthmatic are known to provide health benefits including the prevention or treatment of diseases. The herbal anti-asthmatic market has been on the last few decades around the world including India due to their perceived therapeutic effect and the increase in the public inclination toward shortness of breath. Overall body performance. This research provides a through insight into the medicine properties of anti-asthmatics derive from various herbs/plants, and the difference approaches to powder and purity them. Foremost sources of these compounds include herbs, such as vasaka leaves, tulsi leave, kalonji seeds, cloves, triphala, mulethi roots and ajwain seeds. Which entail major portions of bioactive components aiding their function potential were discussed. It was formulation met all the parameter to become a potent herbal powder. Bioactivity of these operational Components is greatly reliant on different procedure techniques for acquiring high quality and yield of these compounds in a time effective manner. It was found that the formulation was therapeutically. Good and palatable. Safe and effective formulation of combined anti-asthmatic herbs in the form of powder was successfully developed however further clinical evaluation is required before its application.

Funding

No financial assistance was provided for this project.

Conflict of Interest

None declared.

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Citation: *Kumar A, Archana, Fazal B, et al. Development & Evaluation of Multi-Herbal Tea with Anti-Asthmatic Properties. Int Pharm Sci 2026; 19(1):138. doi: 10.31531/2231-5896.1000138*