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FORMULATION AND EVALUATION OF HERBAL TABLET FOR ASTHMA

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ABSTRACT

Asthma is a condition affecting the respiratory system, where the pathways that enable air to flow in and out of the lungs can become restricted at times, leading to coughing, wheezing, and difficulty breathing. This study presents a traditional herbal formulation designed as a natural remedy for asthma management, utilizing synergistic properties of clove (Syzygium aromaticum), saffron (Crocus sativus), nutmeg (Myristica fragrans), musk (or botanical substitute), fenugreek (Trigonella foenum-graecum), and long pepper (Piper longum). These ingredients have been traditionally used for their bronchodilatory, expectorant, anti-inflammatory, and mucolytic effects. The formulation was developed into tablet form using natural binders, allowing ease of administration and improved patient compliance. Preliminary observations suggest the potential of this blend to alleviate symptoms such as wheezing, coughing, and airway inflammation. This herbal combination may serve as a supportive therapy for individuals with mild to moderate asthma, subject to further clinical validation.

KEYWORDS: Asthma, Ayurvedic, Drugs.

INTRODUCTION

Asthma is characterized as a long-lasting inflammatory disorder of the airways. Common symptoms associated with chronic inflammation include wheezing, shortness of breath (Dyspnea), a feeling of tightness in the chest, and coughing, all of which are connected to

airway hyper-responsiveness (An excessive narrowing of the airways in response to triggers like allergens and physical activity). These symptoms usually occur in episodes that are associated with a variable yet significant obstruction of airflow in the lungs, which can generally resolve on its own or with appropriate asthma treatment.[1] Chronic asthma is a respiratory condition that is often managed with bronchodilators and anti-inflammatory drugs. It is marked by airway obstruction, inflammation, and an exaggerated response to various triggers.[2] According to the World Health Organization, asthma ranks as one of the significant non-communicable diseases. It is a long-term condition affecting the airways in the lungs, causing inflammation and constriction. Currently, around 235 million people worldwide suffer from asthma. This condition is particularly common among children; the majority of asthma-related fatalities occur in low- and middle-income countries. According to the WHO report published in December 2016, there were 383000 deaths due to asthma in 2015.[3] Chronic airway inflammation and constriction are hallmarks of Asthma, a prevalent condition affecting both adults and Children.[4,5]

Objective

- Use evidence-based asthma management Techniques while taking into account the Preferences and features of each patient.
- Regularly evaluate the severity, management, and Risk of exacerbations of asthma at follow-up visits.
- Determine the classic signs of asthma, such as Coughing, wheezing and dyspnea.
- Works together with members of an Interdisciplinary health care team to improve Asthma treatment and patient outcomes.
- Control symptoms lessen asthma attacks, Frequency and intensity
- Boost your standard of living allow people to live Active, regular lives.

Common symptoms

- Wheezing, coughing, shortness of breath and chest Tightness are common symptoms of asthma on People. The symptoms can be quite severe and can Get worse at night or during exercise. Early detection of these symptoms can assist ensure prompt Treatment.

Causes

- Smoking
- Environment
- Genetics

- Allergies
- Respiratory infection

Diagnosis

Individuals of all genders and ages can experience asthma, a condition that impacts the lower respiratory system. While there is no single definitive test for diagnosing asthma, there is considerable variability in the underlying mechanisms and clinical signs of the disease, and it is possible to misdiagnose patients, especially those without spirometric evidence.[6]

Consequently, diagnosing asthma relies heavily on spirometry along with a thorough medical history and physical exam. For an accurate asthma diagnosis, it is essential to obtain a detailed medical history, perform a physical examination, and conduct objective assessments of lung function, with a preference for spirometry.

The issue of bronchoprovocation arises when lung function tests yield normal results even though asthma symptoms are evident. In such cases, assessing and testing for signs of airway inflammation can be beneficial in diagnosing the condition.[7,8,9]

Material

1. **Clove**

Fig. No. 01: Clove powder.

Synonym: Clove bud

Family: Myrtaceae

Use: Use of Clove and clove oil may help in asthma symptoms, such as wheezing, chest pain, difficulty breathing.

- **Properties and Actions**

1) **Kaphahara:** Clove is believed to help reduce kapha (Mucus) in the respiratory tract.
2) **Shvasahara:** love is thought to help alleviate respiratory problems, including asthma.
3) **Anti-inflammatory and Antioxidant effects:** Clove contains eugenol, which may help reduce inflammation and oxidative stress.

- **Uses in asthma treatment**

1) **Expectorant properties:** Clove may help loosen and clear mucus from the respiratory tract.
2) **Bronchodilatory effects:** Clove may help relax airway smooth muscles, improving lung function.
3) **Antimicrobial properties:** Clove's antimicrobial effects may help prevent respiratory infections.

- **Ayurvedic Preparations**

1) **Lavanga churna:** A powder made from clove buds, clove tail, often used to treat respiratory issues.

- **Precautions and Contraindications**

1) **Consult a practitioner:** Before using clove or any Ayurvedic herb, consult with a qualified practitioner.
2) **Dosage and Preparation:** Follow recommended dosages and preparation methods to avoid adverse effects.

2. Musk fenugreek

Fig. No. 02: Musk fenugreek powder.

Synonyms: Methi, Methika

Family: Leguminaceae

Serum cytokine IL-4 levels significantly decreased when Fenugreek seed extract was used, while FEV1 and FEV1/FVC levels increased by 10%.the results of the study indicate that fenugreek seed aqueous extract may be utilized to treat moderate asthma because of its minimal adverse effects.

In Ayurvedic medicine, Musk Fenugreek (Trigonella foenum-graecum), also known as "Methi," is considered a valuable herb for respiratory issues, including asthma.

- **Properties and Actions**

1) **Kaphahara:** Musk Fenugreek is believed to help reduce kapha (mucus) in the respiratory tract.
2) **Shvasahara:** Musk Fenugreek is thought to help alleviate respiratory problems, including asthma.
3) **Anti-inflammatory and antioxidant effects:** Musk Fenugreek contains compounds like diosgenin, which may help reduce inflammation and oxidative stress.

- **Uses in asthma treatment**

1) **Expectorant properties:** Musk Fenugreek may help loosen and clear mucus from the respiratory tract.
2) **Bronchodilatory effects:** Musk Fenugreek may help relax airway smooth muscles, improving lung function.
3) **Immunomodulatory effects:** Musk Fenugreek may help regulate the immune response, reducing allergic inflammation.

- **Ayurvedic preparations**

1) **Methi churna:** A powder made from Musk Fenugreek seeds, often used to treat respiratory issues.
2) **Methi tea:** A tea made from Musk Fenugreek seeds, which may help alleviate respiratory symptoms.

Precautions and Contraindications

1) **Consult a practitioner:** Before using Musk Fenugreek or any Ayurvedic herb, consult with a qualified practitioner.

2) **Dosage and Preparation:** Follow recommended dosages and preparation methods to avoid adverse effects.
3) **Pregnancy and Lactation:** Musk Fenugreek may stimulate uterine contractions, so it's recommended to avoid it during pregnancy.

3. Nutmeg

Fig. No. 03: Nutmeg Powder.

Synonyms: Myristica aromata

Family: Myristicaceae Nutmeg reported to exhibit anti inflammatory effects in vivo in an asthmatic model by significantly reducing the expression of IL-4 and Th2 cell specific master transcription factor.

In Ayurvedic medicine, Nutmeg (Myristica fragrans) is considered a valuable spice for various health issues, including respiratory problems like asthma.

- **Properties and Actions**

1) **Kaphahara:** Nutmeg is believed to help reduce kapha (mucus) in the respiratory tract.
2) **Shvasahara:** Nutmeg is thought to help alleviate respiratory problems, including asthma.
3) **Anti-inflammatory and antioxidant effects:** Nutmeg contains compounds like myristicin, which may help reduce inflammation and oxidative stress.

- **Uses in asthma treatment**

1) **Expectorant properties:** Nutmeg may help loosen and clear mucus from the respiratory tract.
2) **Bronchodilatory effects:** Nutmeg may help relax airway smooth muscles, improving lung function.

3) **Calming effects:** Nutmeg's calming properties may help reduce stress and anxiety, which can trigger asthma symptoms.

Ayurvedic Preparations

1) **Jaiphal churna:** A powder made from Nutmeg seeds, often used to treat respiratory issues.
2) **Jaiphal milk:** A traditional remedy made by boiling Nutmeg in milk, which may help alleviate respiratory symptoms.

- **Precautions and Contraindications**

1) **Consult a practitioner:** Before using Nutmeg or any Ayurvedic herb, consult with a qualified practitioner.
2) **Dosage and Preparation:** Follow recommended dosages and preparation methods to avoid adverse effects.
3) **High doses may cause side effects:** Nutmeg can cause nausea, vomiting, and hallucinations in high doses.

4. Saffron

Fig. No. 04 Saffron.

Synonyms: Kesoar

Family: Iridaceae.

Saffron is believed to improve the asthma symptoms due to airway inflammation, hyper responsiveness and muscle contraction. It means relax the muscle contraction Saffron, known as Kesar in Ayurveda, is utilized to alleviate respiratory issues, including asthma. Its therapeutic properties help relieve cough and asthma symptoms when taken with honey.

Anti-inflammatory effects: Saffron's anti-inflammatory properties help reduce inflammation in the airways, making it easier to breathe.

Bronchodilatory effects: Saffron may help relax airway smooth muscles, improving lung function and reducing symptoms like wheezing and shortness of breath.

Antioxidant properties: Saffron's antioxidant properties help protect against oxidative stress, which can exacerbate asthma symptoms.

Expectorant properties: Saffron may help loosen and clear mucus from the respiratory tract, relieving congestion.

- **Ayurveda Preparations and Dosage**

To incorporate saffron into your asthma treatment, consider the following:-

Saffron threads: Take 5-6 threads with milk once or twice a day. Saffron capsule or tablet: Consult with a healthcare professional for recommended dosages.

Precautions and Interactions

While saffron is generally considered safe,

- Consult a healthcare professional: Before using saffron or any Ayurvedic herb, consult with a qualified practitioner to discuss potential interactions with medications or allergies.
- Monitor dosage: Be cautious of high doses, as they may cause side effects like nausea or allergic reactions.

Research evidence

Studies suggest that saffron supplementation can improve asthma symptoms, reducing the frequency of shortness of breath, salbutamol spray use, and activity limitation.

5. Piper longum

Fig. No. 05: Piper longum.

Synonyms: Chavica roxburghii Miquel

Family: Piperaceae

Study found that Piper longum can reduce airway inflammation and remodeling in asthmatic mice.

Piper longum, also known as Pippali in Ayurveda, is a valuable herb for respiratory issues, including asthma.

Properties and Actions

1) **Kaphahara:** Piper longum is believed to help reduce kapha (mucus) in the respiratory tract.
2) **Shvasahara:** Piper longum is thought to help alleviate respiratory problems, including asthma.
3) **Anti-inflammatory and Antioxidant effects:** Piper longum contains compounds like piperine, which may help reduce inflammation and oxidative stress.

Uses in asthma treatment

1) **Expectorant properties:** Piper longum may help loosen and clear mucus from the respiratory tract.
2) **Bronchodilatory effects:** Piper longum may help relax airway smooth muscles, improving lung function.
3) **Immunomodulatory effects:** Piper longum may help regulate the immune response, reducing allergic inflammation.

Ayurvedic preparations

1) **Pippali churna:** A powder made from Piper longum fruits, often used to treat respiratory issues.
2) **Pippali rasayana:** A rejuvenating preparation made from Piper longum, which may help improve respiratory health.

Precautions and Contraindications

1) **Consult a practitioner:** Before using Piper longum or any Ayurvedic herb, consult with a qualified practitioner.
2) **Dosage and Preparation:** Follow recommended dosages and preparation methods to avoid adverse effects.

3) **Pregnancy and Lactation:** Piper longum may stimulate uterine contractions, so it's recommended to avoid it during pregnancy.

Procedure

Powder preparation

Dry all herbal ingredients under shade.

Grind each into a fine powder (sieve #60).

Mix all powdered herbs in equal or therapeutically adjusted ratios.

Mixing: Mix the herbal powders uniformly with microcrystalline cellulose.

Wet granulation: Prepare starch paste (10%)

Add starch paste slowly to the mixture to form a damp mass.

Pass the wet mass through sieve #16 to form granules.

Drying: Dry granules at 45–50°C in a tray dryer or oven until moisture content <2%.

Sizing: Pass dried granules through sieve #20 for uniform size.

Lubrication: Mix granules with talc and magnesium stearate.

Compression: Compress granules into tablets using a tablet compression machine.

Evaluation of tablet

1. Preformulation study

A. Angle of repose

Angle of repose is were used to check the flowability of the granules in Hopper before compression of tablet. Fixed funnel method is used to check the angle of repose. At The specific height the funnel was fixed on the graph paper which is placed horizontally at surface. Then the granules was passed to the funnel until the apex of the pile touched to the tip of the funnel. Radius was measured by using scale and determined the angle of repose by using following

Formula.

Theta= $\tan^{-1}(h/r)$

Where,

Theta - Angle of Repose

H – Height of pile

R – Radius of pile

B. Bulk density

Fig. No. 06: Bulk density test.

A known amount of granules was transferred into a 25ml of measuring cylinder, Carefully level the powder without compacting and measure the bulk volume Bulk Density = weight of powder / Bulk Volume.

C. Tapped density

Fig. No. 07: Tapped density test.

Tapped density is the ratio of weight of powder to the Tapped volume. It was determined by tapping a measuring cylinder containing fixed quantity of powder for the specific period of time. The tapped density was calculated by using following formula.

Tapped Density = Weight of Powder / Tapped

D. Hausner ratio

It was determined after the measuring of Tapped density and bulk density. It is the densitification of the herbal powder mixture which may result from the vibration of the feed hopper which was calculated by using below formula

Hausner Ratio = Tapped Density / Bulk Density

E. Carr's index

Carr's index was used to check the compressibility and flow of the granules from hopper. It is expressed in percentage(10). Carr's index was calculated by using following formula.

Carr; s Index = Bulk Volume – Tapped volume / Bulk volume × 100

2. Hardness

The Hardness of the Tablet is also called as Tablet Crushing strength. Harness test is used to check the hardness of the prepared tablet. In this test we can measured the force which is required for the breaking of the tablet. Monsanto tablet hardness tester is used to check the hardness of the tablet. The hardness is express in Kg/cm2.

Fig. No. 08 Hardness tester.

3. Weight variation

Fig. No. 09: Wt. Variation.

It is also called Uniformity of weight. In this evaluation test twenty tablet were weighed separately and then average weight was determined. The percentage deviation was calculated and check for weight variation as per IP.

4. Friability test

The friability test is used to check the combined effect of abrasion and stock. This test is used to check the tablet is suitable for transportation or not for that purpose Roche Friabilator is used it is laboratoryfriability tester. In that the preweighed antidiabetic tablet sample is placed in the friabilator which consist of plastic chamber that operate 100 revolution for 4 min means 25 rpm. The tablet are then dusted and reweighed. Conventional compressed tablet that loses less than that 0.5-1.0 % of their weight are generally acceptable Fig.4: Friability test.

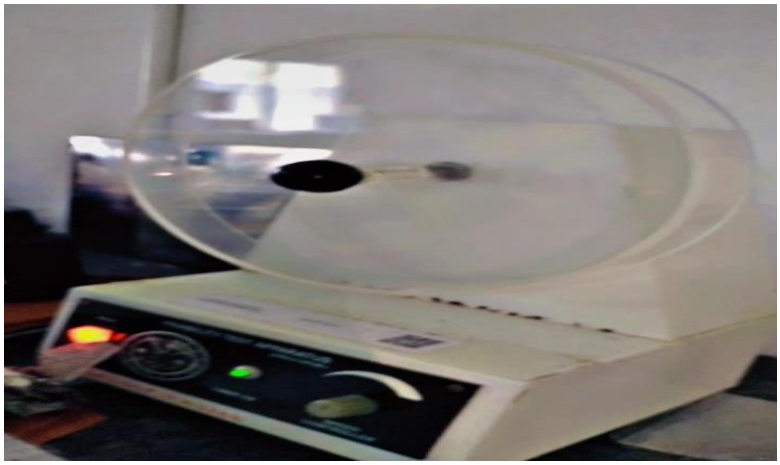

Fig. No. 10: Friability test.

5. Dissolution test

Dissolution is the process by which a solid solute enters in the solution. It may be defined as the amount of drug substance that goes into solution per unit time. The disintegration test simply identified the time required for the tablet to break up under the condition of test and all the particles are passed through mesh no.10 screen. The rate of drug absorption of acidic drug is high in GIT. So for that purpose the rate of dissolution is determined. For determination of dissolution rate of tablet we were take 900ml of 0.1N HCL in basket of dissolution apparatus and which were rotated at 50 rpm and time limit of 20 min. The accepted amount dissolution limit for 20 min is not less than 80%.

Fig. No. 11: Dissolution apparatus.

RESULT

Table No. 01: Result.

Sr. No.	Evaluation of parameters	Result
1	Angle of repose	42 degree Fair flowability
2	Bulk density	2.18
3	Tapped density	2.47
4	Hausner ratio	1.13
5	Carr's ratio	12
6	Hardness	7.4 kg
7	Weight	510mg
8	Friability	0.515%
9	Dissolution	5min.

CONCLUSION

The combination of saffron, nutmeg, musk, fenugreek, clove, and piper longum reflects a traditional Ayurvedic approach to managing asthma by targeting both respiratory inflammation and kapha imbalance. These ingredients collectively work to improve lung function, reduce mucus buildup, and enhance respiratory immunity. Piper longum acts as a bronchodilator, clove and nutmeg have anti-inflammatory properties, fenugreek helps inexpectoration, while saffron and musk may calm the respiratory tract. This formulation aligns with Ayurveda's holistic principle of restoring balance in the body, though it should be used under professional guidance to ensure safety and efficacy.

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