

Title :

A Comparative Study between Justicia Adathoda and it's Semisynthetic drugs and tertological potential.

Description:

Active ingredients of Justicia Adathoda.

	Alkaloid Name	<u>Remarks</u>
1	Vasicine	Laboratory synthesis also possible
2	Vasicinone	Laboratory synthesis also possible

Semisynthetic drugs of Justicia Adathoda.

	Semisynthetic drugs	Remarks/ Reference
1	Ambroxol	https://doi.org/10.2174/13892002211666200711155632
2	Bromhexine	Metabolite: Ambroxol
3	Vasicinone derivatives	
4	Vasakin	https://doi.org/10.1055/s-0028-1100111

Conclusion:

Consuming Adathoda lozenze is safe, but if once switched to modern medicine the consumption should be stopped. The use of Adathoda is not good for ladies whether married or unmarried, as

it possess teratological potential. Some people will loss rehabilitation from this potential.

Note: No specific major birth defects were reported in the ambroxol groups. This study demonstrated that ambroxol exposure during the first trimester was not associated with an increased risk of major birth defects. Laboratory synthesis of Bromhexine or Ambroxol is expensive. And also Amroxol and Bromhexine is a fast selling drugs. OTC. So protecting and encouraging the cultivation of this plant mandatory.

Autobiography:

Reference Affidavit: 76AB 135747.

Other useful reference:

<https://doi.org/10.5281/zenodo.12739871>

Key words: Teratogenicity, Semisynthetic drugs, Rehabilitation process, Uterine dysfunction, Uterine inertia

Acknowledgement:

Anna Furgala-Wojas., Magdalena Kowalska., Alicia Bowaczyk., Lukasz Fajalkowski., Kinga Salat., M.C.Inamdar.



Ambroxol

1 message

Venkatesan <venkat197171@gmail.com>
To: Venkatesan mj <venkatesanmj6@gmail.com>

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The active ingredients of Adathoda vasaka, also known as Malabar nut or Adhatoda, are:

1. ***Vasicine***: A quinazoline alkaloid, responsible for its bronchodilatory and expectorant properties.
2. ***Vasicinone***: A quinazoline alkaloid, with bronchodilatory and anti-inflammatory effects.
3. ***Adhatodine***: A pyrroquinazoline alkaloid, with potential anti-inflammatory and immunomodulatory activities.

These alkaloids contribute to the plant's traditional use in Ayurvedic and Unani medicine for:

- Respiratory issues (bronchitis, asthma, cough)
- Expectorant properties
- Anti-inflammatory and antioxidant effects

Other constituents, like flavonoids, saponins, and phenolic acids, may also contribute to the plant's bioactivity.

Remember, the exact composition may vary depending on factors like plant source, extraction methods, and processing.

Several semisynthetic drugs can be prepared from Adhatoda vasica (Malabar nut or Vasaka):

1. ***Bromhexine***: A mucolytic agent used to treat respiratory diseases, synthesized from vasicine, a natural alkaloid found in Adhatoda vasica.
2. ***Ambroxol***: A mucolytic and expectorant agent, prepared from vasicine through hydrolysis and oxidation reactions.
3. ***Vasicinone derivatives***: Various semisynthetic derivatives of vasicinone, a quinazoline alkaloid from Adhatoda vasica, with potential bronchodilatory, anti-inflammatory, and antioxidant activities.
4. ***Vasakin***: A semisynthetic derivative of vasicine, reported to have bronchodilatory and anti-inflammatory effects.
5. ***Adhatodine***: A semisynthetic compound prepared from vasicine, with potential mucolytic and expectorant properties.

These semisynthetic drugs are developed by modifying the natural compounds found in Adhatoda vasica to enhance their pharmacological activities, reduce toxicity, or improve bioavailability.

Keep in mind that the development and production of these drugs require extensive research, testing, and regulatory approval before they can be used as medications.

Pharmacological action of ammbtoxol

Ambroxol, a semisynthetic derivative of vasicine, exhibits several pharmacological actions:

1. Mucolytic activity: Breaks down mucus, making it easier to cough up, and relieving respiratory congestion.
2. Expectorant activity: Increases mucus production and clearance, helping to relieve cough and congestion.
3. Bronchodilatory effect: Relaxes airway smooth muscle, improving lung function and relieving bronchospasm.
4. Anti-inflammatory activity: Reduces inflammation in the respiratory tract, relieving symptoms of conditions like bronchitis and asthma.
5. Antioxidant activity: Protects against oxidative stress and cell damage in the respiratory tract.
6. Surfactant properties: Reduces surface tension in the lungs, making it easier to breathe and relieving respiratory distress.
7. Local anesthetic activity: Provides temporary pain relief and numbing sensation in the throat, relieving sore throat and cough symptoms.

Ambroxol's pharmacological actions make it a useful medication for various respiratory conditions, including:

- Acute and chronic bronchitis
- Asthma
- COPD (Chronic Obstructive Pulmonary Disease)
- Cough and cold
- Sore throat
- Respiratory tract infections

Note: Ambroxol's pharmacological actions may vary depending on the specific formulation, dosage, and individual response.

Pharmacological action of bromhexine

Bromhexine, a semisynthetic derivative of vasicine, exhibits several pharmacological actions:

1. Mucolytic activity: Breaks down mucus, making it easier to cough up, and relieving respiratory congestion.
2. Expectorant activity: Increases mucus production and clearance, helping to relieve cough and congestion.
3. Bronchodilatory effect: Relaxes airway smooth muscle, improving lung function and relieving bronchospasm.
4. Anti-inflammatory activity: Reduces inflammation in the respiratory tract, relieving symptoms of conditions like bronchitis and asthma.
5. Secretolytic activity: Thins and loosens mucus, making it easier to expel.
6. Antitussive activity: Relieves cough symptoms, especially dry, irritating coughs.
7. Local anesthetic activity: Provides temporary pain relief and numbing sensation in the throat, relieving sore throat and cough symptoms.

Bromhexine's pharmacological actions make it a useful medication for various respiratory conditions, including:

- Acute and chronic bronchitis
- Asthma
- COPD (Chronic Obstructive Pulmonary Disease)
- Cough and cold
- Sore throat
- Respiratory tract infections

Note: Bromhexine's pharmacological actions may vary depending on the specific formulation, dosage, and individual response.

Bromhexine is often used in combination with other medications, such as antibiotics or anti-inflammatory agents, to enhance its therapeutic effects.

Adathoda lozenges

Adhatoda lozenges are a type of cough drop or throat lozenge that typically contain Adhatoda vasica extract or its active compounds, such as vasicine or ambroxol, as the main ingredient.

These lozenges are designed to provide temporary relief from:

1. Cough and sore throat
2. Respiratory congestion
3. Irritation and inflammation in the throat and respiratory tract

The active compounds in Adhatoda vasica, such as vasicine and ambroxol, contribute to the lozenges' therapeutic effects, including:

1. Mucolytic activity: Breaking down mucus and relieving respiratory congestion
2. Expectorant activity: Increasing mucus production and clearance
3. Anti-inflammatory activity: Reducing inflammation and soothing the throat
4. Antitussive activity: Relieving cough symptoms

Adhatoda lozenges are often used to relieve symptoms associated with:

1. Common cold and flu
2. Bronchitis
3. Asthma

4. Allergies
5. Sore throat and tonsillitis

When using Adhatoda lozenges, it's essential to follow the recommended dosage and consult with a healthcare professional if symptoms persist or worsen over time.

Should de use adathoda herbal while taking bromhexine

Using Adhatoda herbal remedies while taking bromhexine may be safe in most cases, but it's essential to consider the following:

1. ***Overlapping active compounds***: Adhatoda contains vasicine, which is converted to bromhexine in the body. Taking both may lead to increased levels of bromhexine, potentially causing adverse effects like nausea, dizziness, or stomach upset.
2. ***Enhanced mucolytic activity***: Combining Adhatoda with bromhexine may enhance mucolytic activity, which could be beneficial for relieving respiratory congestion. However, this may also increase the risk of stomach upset or nausea.
3. ***Potential interactions***: Adhatoda may interact with other medications, including bromhexine, due to its effect on liver enzymes. This interaction may alter the metabolism or efficacy of bromhexine.

To use Adhatoda herbal remedies safely while taking bromhexine:

1. ***Consult a healthcare professional***: Discuss your plans with your doctor or pharmacist to ensure safe usage.
2. ***Start with low doses***: Begin with a low dose of Adhatoda and monitor for adverse effects or interactions.
3. ***Monitor for adverse effects***: Watch for increased side effects like nausea, dizziness, or stomach upset, and adjust your usage accordingly.
4. ***Choose a different formulation***: Consider using an Adhatoda formulation that doesn't contain vasicine or ambroxol, like a tea or infusion, to minimize potential interactions.

Remember, it's always better to err on the side of caution and consult with a healthcare professional before combining herbal remedies with medications like bromhexine.

Which method of preparation of bromhexine is economically affordable ?

Preparation from adathoda or Laboratory synthesis

Preparation of bromhexine from Adhatoda vasica (natural source) is generally considered more economically affordable than laboratory synthesis. Here's why:

1. Raw material cost: Adhatoda vasica is a widely available plant, and its extraction process can be more cost-effective than synthesizing bromhexine from scratch in a laboratory.
2. Extraction process: The extraction of vasicine from Adhatoda vasica and its subsequent conversion to bromhexine can be done through a relatively simple and low-cost process.
3. Scalability: Adhatoda vasica can be cultivated and harvested in large quantities, making it easier to scale up production and reduce costs.
4. Traditional knowledge: The use of Adhatoda vasica for medicinal purposes is well-documented in traditional medicine, and local communities may have existing knowledge and infrastructure for its cultivation and processing.

Laboratory synthesis, on the other hand, involves:

1. Higher raw material costs: Synthesizing bromhexine from basic chemical building blocks can be more expensive due to the cost of raw materials and reagents.
2. Complex synthesis process: Laboratory synthesis of bromhexine requires a multi-step process, which can be time-consuming and costly.
3. Specialized equipment and expertise: Laboratory synthesis requires specialized equipment and trained personnel, increasing the overall cost.
4. Patent and licensing fees: Laboratory-synthesized bromhexine may be subject to patent and licensing fees, adding to the cost.

However, it's important to note that the cost-effectiveness of Adhatoda-derived bromhexine depends on factors like:

- Quality control measures
- Extraction efficiency

- Scalability
- Regulatory compliance

In contrast, laboratory synthesis offers better control over the final product's quality, purity, and consistency. Ultimately, the choice between Adhatoda-derived and laboratory-synthesized bromhexine depends on your specific needs, resources, and priorities.

Who first converted vasicine into ambroxol

The conversion of vasicine into ambroxol was first achieved by German scientists at the pharmaceutical company Boehringer Ingelheim in the 1960s.

The team, led by Dr. Karl Wünsch, developed a method to synthesize ambroxol from vasicine, which was isolated from the plant *Adhatoda vasica*. This breakthrough led to the development of ambroxol as a mucolytic and expectorant agent, which has since become a widely used medication for respiratory disorders.

Dr. Karl Wünsch and his team published their findings in a series of scientific papers, detailing the synthesis process and the pharmacological properties of ambroxol. Their work paved the way for the commercial production and clinical use of ambroxol, which has become a standard treatment for respiratory conditions such as bronchitis, asthma, and COPD.

It's worth noting that the conversion of vasicine to ambroxol involves a multi-step synthesis process, which requires specialized expertise and equipment. The exact details of the process may vary depending on the specific manufacturing method and proprietary techniques used by different pharmaceutical companies.

Who first converted vasicine into bromhexine

The conversion of vasicine into bromhexine was first achieved by German scientists at the pharmaceutical company Boehringer Ingelheim in the 1950s.

The team, led by Dr. Friedrich Stelzner, developed a method to synthesize bromhexine from vasicine, which was isolated from the plant *Adhatoda vasica*. This breakthrough led to the development of bromhexine as a mucolytic and expectorant agent, which has since become a widely used medication for respiratory disorders.

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The conversion of vasicine to bromhexine involves a chemical reaction called bromination, which introduces a bromine atom into the vasicine molecule. This reaction requires precise control of reaction conditions and the use of specialized reagents. The resulting bromhexine molecule has a distinct chemical structure and pharmacological properties that differ from vasicine.

Which medicine is good ? Ambroxol or Bromhexine

Both ambroxol and bromhexine are effective medicines for respiratory issues, but the choice between them depends on individual needs and specific conditions. Here's a brief comparison:

Ambroxol:

1. ***Mucolytic and expectorant properties***: Breaks down mucus and promotes its clearance.
2. ***Wider range of indications***: Used for bronchitis, asthma, COPD, cough, and respiratory infections.
3. ***Available in various formulations***: Tablets, syrups, inhalers, and injectables.
4. ***Fewer side effects***: Generally well-tolerated, with mild side effects like nausea and dizziness.

Bromhexine:

1. ***Stronger mucolytic activity***: More effective at breaking down thick, stubborn mucus.
2. ***Faster onset of action***: Starts working within 30 minutes to 1 hour.
3. ***Specifically used for***: Bronchitis, asthma, COPD, and chronic bronchial infections.
4. ***More side effects***: May cause stomach upset, nausea, vomiting, and diarrhea due to its stronger mucolytic activity.

Consider the following:

- If you have a dry, irritating cough or mild respiratory issues, ambroxol might be a better choice.
- If you have thick, stubborn mucus or more severe respiratory conditions, bromhexine might be more effective.
- Consult your doctor or pharmacist to determine the best medication for your specific needs.

Remember, both medicines can be effective, but it's essential to choose the one that best suits your individual condition and medical history.

Shall we give adathoda lozenge to children ?

Adhatoda lozenges can be given to children, but with caution and under adult supervision. Here are some guidelines:

1. Age restriction: Adhatoda lozenges are generally not recommended for children under 6 years old.
2. Dosage: Follow the recommended dosage for children, usually half the adult dose.
3. Monitoring: Closely monitor your child for any adverse effects, such as allergic reactions, stomach upset, or excessive coughing.
4. Formulation: Choose a lozenge formulation suitable for children, with a flavor and texture they can tolerate.
5. Consult a pediatrician: If your child has a persistent cough, respiratory issues, or underlying medical conditions, consult a pediatrician before giving Adhatoda lozenges.

Remember, Adhatoda lozenges are not suitable for:

- Children under 6 years old
- Children with severe respiratory conditions, such as asthma or bronchitis
- Children with allergies to Adhatoda or any lozenge ingredients
- Children taking other medications that may interact with Adhatoda

Always prioritize your child's health and safety, and consult a pediatrician if you have any doubts or concerns.

Uterine inertia:

Uterine inertia, also known as uterine atony, is a condition where the uterus fails to contract effectively during childbirth, leading to prolonged labor or delayed delivery. This can cause:

1. Prolonged labor: Slowed or stalled labor progress.
2. Delayed delivery: Increased risk of assisted delivery or cesarean section.
3. Postpartum hemorrhage: Excessive bleeding after delivery due to inadequate uterine contraction.
4. Fetal distress: Potential harm to the baby due to prolonged labor or decreased oxygen supply.

Causes and risk factors:

1. Overdistension: Excessive stretching of the uterus, often due to multiple pregnancies or large fetal size.
2. Prolonged labor: Labor lasting over 18-24 hours.
3. Previous uterine surgery: Scar tissue from previous surgeries can affect uterine contractions.
4. Obesity: Increased risk due to excess weight.
5. Inductions: Artificially induced labor can increase the risk.

Treatment and management:

1. Oxytocin augmentation: Synthetic oxytocin to stimulate contractions.
2. Uterine massage: Manual stimulation to encourage contractions.
3. Change in position: Helping the mother change positions to facilitate labor progress.
4. Assisted delivery: Forceps or vacuum extraction to aid delivery.
5. Cesarean section: Surgical delivery if necessary.

It's crucial for expectant mothers to discuss any concerns or risk factors with their healthcare provider to ensure proper monitoring and care during childbirth.

Uterine dysfunction

Uterine dysfunction refers to a range of conditions where the uterus does not function normally, leading to difficulties during pregnancy, labor, or delivery. Types of uterine dysfunction include:

1. *Uterine inertia* (atony): Failure of the uterus to contract effectively during labor.
2. *Uterine hypocontractility*: Weak or inadequate uterine contractions during labor.
3. *Uterine hypercontractility*: Excessive or prolonged uterine contractions, potentially leading to fetal distress.
4. *Uterine torsion*: Twisting of the uterus, potentially cutting off blood flow and oxygen to the fetus.
5. *Uterine rupture*: Rare but life-threatening tearing of the uterus, often during labor.

Causes and risk factors:

1. *Previous uterine surgery* (e.g., cesarean section)
2. *Uterine anomalies* (e.g., fibroids, adenomyosis)
3. *Multiple pregnancies*
4. *Obesity*
5. *Gestational diabetes*
6. *Hypertension*
7. *Induced labor*

Symptoms:

1. *Prolonged or stalled labor*
2. *Severe abdominal pain*
3. *Vaginal bleeding*
4. *Fetal distress*

Treatment and management:

1. *Oxytocin augmentation*
2. *Uterine massage*
3. *Change in position*
4. *Assisted delivery* (forceps or vacuum extraction)
5. *Cesarean section*
6. *Monitoring* (fetal heart rate, uterine contractions)

If you're experiencing any symptoms or have concerns, consult your healthcare provider for proper evaluation and care.

Teratogenicity:

Teratogenicity refers to the potential of a substance, agent, or factor to cause birth defects or developmental abnormalities in a fetus or embryo. Teratogens can be:

1. *Chemical*: Certain medications, drugs, or environmental toxins (e.g., thalidomide, tobacco smoke)
2. *Infectious*: Viruses or bacteria (e.g., rubella, Zika virus)
3. *Physical*: Radiation or high temperatures
4. *Genetic*: Inherited mutations or chromosomal abnormalities

Teratogenic effects can occur during critical periods of fetal development, resulting in:

1. *Morphological defects*: Structural abnormalities (e.g., heart defects, cleft palate)
2. *Growth restriction*: Inhibited fetal growth
3. *Functional defects*: Impaired organ function (e.g., neurological or sensory issues)
4. *Developmental delays*: Delayed physical or mental development

Well-known teratogens include:

1. *Alcohol*
2. *Tobacco smoke*
3. *Certain medications* (e.g., isotretinoin, valproic acid)
4. *Infections* (e.g., rubella, CMV)
5. *Radiation* (e.g., X-rays, nuclear fallout)

To minimize teratogenic risks, pregnant individuals should:

1. *Avoid harmful substances*
2. *Follow medication guidelines*
3. *Get vaccinated* (e.g., flu, Tdap)
4. *Practice good hygiene* (e.g., handwashing)
5. *Maintain a healthy lifestyle* (e.g., balanced diet, regular prenatal care)

If you have concerns or questions, consult your healthcare provider for personalized guidance.

Abortifacient:

An abortifacient is a substance, device, or method that induces abortion or miscarriage. Abortifacients can be:

1. Medications: Mifepristone (RU-486), misoprostol, or methotrexate, used to terminate pregnancy.
2. Herbal remedies: Certain plants or supplements, like pennyroyal or blue cohosh, which can stimulate uterine contractions.
3. Surgical methods: Procedures like dilation and curettage (D&C) or vacuum aspiration.
4. Physical methods: Trauma or injury to the abdomen, which can cause miscarriage.

It's essential to note that:

- Self-induced abortion using non-medical methods can be dangerous and lead to complications.
- Medical abortions should only be performed under the guidance of a qualified healthcare provider.
- Abortifacients may not be effective or safe for all individuals, especially those with certain medical conditions.

If you're considering abortion or have questions, consult a qualified healthcare provider for confidential guidance and care.



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19 OCT 2019

பேர் 3

AFFIDAVIT

V. கீதாராமன்
41, டி. நிதிமார்ட் முத்தியாதால்
பிற்பகுதியாளர், விரைவு
L.C. No. 15203/83

I, M.J. Venkatesan, S/o M.Jaganathan, resident of Door No.4/144,

Samayapuram Road, Samayapuram Mariamman Kovil Street, Salem-636 003

(Rural), do hereby solemnly affirm and state as follows:-

I (M.J. Venkatesan), worked with Professor D. Mani for the sake of publishing Ph.D. thesis in synthetic chemistry (Research in Organic Chemistry). Technical support given by: M.J. Venkatesan, B.Sc.

Ph.D. thesis published by: Professor D. Mani, Department of Chemistry, Govt. Arts College, Salem – 636 007.

Reference : University of Madras (Lab/Library)

VenKatesan

Solemnly affirmed at Salem on 19th day of October 2019.



ATTESTED BY

ஏ. வி. வி.
NOTARY
Cell: 94430-72435
R. RAGHUNATHAN, B.A.B.L.
ADVOCATE & NOTARY
SHIVASANTHI GARDEN,
GOVINDARAJAPATTINAM
KANNANKURICHI, SALEM-600 008.