RESEARCH PAPER

# Preparation Of The Preparation "Alerva" Based On Plants Of False Camel Thorn (Alhagi Pseudalhagi (M.Bieb.) Desv.) And Woolly Willow (Aerva Lanata (L.) Juss.) And Standardization

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**Abstract**

Herbal medicine continues to gain global acceptance due to its therapeutic efficacy, safety profile, and cultural relevance. The present review focuses on the preparation and standardization of the polyherbal formulation "alerva," developed using alhagi pseudalhagi and aerva lanata, two medicinal plants widely recognized in traditional systems of medicine for their diuretic, antiurolithiatic, and nephroprotective properties. This study compiles and critically analyzes available literature on the phytochemical composition, pharmacological activities, and formulation strategies associated with these plants. Emphasis is placed on the systematic preparation of the formulation, including selection of raw materials, extraction techniques, and optimization of formulation parameters to ensure consistency and efficacy. Furthermore, the review highlights essential standardization protocols such as organoleptic evaluation, physicochemical analysis, phytochemical screening, and advanced analytical techniques to ensure quality, purity, and reproducibility of the formulation. The integration of modern standardization methods with traditional knowledge is discussed as a key approach to enhancing the reliability and acceptance of herbal products in contemporary healthcare. Overall, this comprehensive review provides a scientific basis for the development, evaluation, and quality control of the alerva formulation, supporting its potential as a safe and effective herbal therapeutic agent.

# Preparation of the preparation "Alerva" based on plants of false camel thorn (Alhagi pseudalhagi (M.BIEB.) DESV.) and woolly willow (Aerva lanata (L.) Juss.) and standardization

**Keywords:** Alhagi Pseudalhagi, Aerva Lanata, Polyherbal Formulation, Standardization, Drug Delivery, Phytochemistry.

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## 1. Introduction

The growing interest in plant-based therapeutics has significantly influenced modern healthcare systems, leading to renewed attention toward traditional medicinal knowledge and herbal formulations. Natural products derived from medicinal plants are increasingly preferred due to their perceived safety, affordability, and minimal side effects compared to synthetic drugs. In this context, polyherbal formulations—combinations of two or more medicinal plants—have gained importance for their synergistic therapeutic effects and broader pharmacological actions.

Among the numerous medicinal plants used in traditional systems, Alhagi pseudalhagi and Aerva lanata hold a prominent position due to their well-documented medicinal properties. *Alhagi pseudalhagi* has been traditionally used for its diuretic, anti-inflammatory, hepatoprotective, and antiurolithiatic activities. It is particularly valued in the management of kidney stones and urinary tract disorders. Similarly, *Aerva lanata* is widely recognized in Ayurvedic and folk medicine for its diuretic, nephroprotective, antimicrobial, and antioxidant properties, making it an important herb in the treatment of renal ailments and urinary complications.

The formulation “Alerva” is conceptualized as a polyherbal combination of these two plants to enhance therapeutic efficacy through synergistic interactions of their bioactive constituents. The rationale behind such formulations lies in the holistic approach of traditional medicine, where multiple plant components work together to target different aspects of a disease while reducing potential toxicity. However, despite their widespread use, herbal formulations often face challenges related to quality control, standardization, and reproducibility, which can limit their acceptance in evidence-based medicine. Standardization plays a critical role in ensuring the safety, efficacy, and consistency of herbal products. It involves a series of evaluations, including organoleptic characteristics, physicochemical parameters, phytochemical profiling, and advanced analytical techniques. Establishing standardized procedures for preparation and quality assessment is essential for transforming traditional formulations into scientifically validated therapeutic agents.

This review aims to provide a comprehensive overview of the preparation and standardization of the herbal formulation “Alerva.” It emphasizes the pharmacological significance of its constituent plants, outlines systematic approaches to formulation development, and highlights modern standardization techniques. By bridging traditional knowledge with contemporary scientific validation, this work contributes to the advancement of reliable and effective herbal medicines in modern healthcare systems.

## 2. Botanical and Ethnomedicinal Background

Medicinal plants have long served as a cornerstone of traditional healing systems, providing a rich source of bioactive compounds with diverse therapeutic applications. Among such plants, Alhagi pseudalhagi and Aerva lanata are widely recognized for their medicinal value, especially in the management of renal and urinary disorders. A detailed understanding of their botanical characteristics and ethnomedicinal uses is essential for the scientific development of polyherbal formulations such as “Alerva.”

### Botanical Description

*Alhagi pseudalhagi* belongs to the family Fabaceae and is a perennial, spiny shrub commonly found in arid and semi-arid regions. It typically grows up to 1–1.5 meters in height and is characterized by rigid branches, small leaves, and pink to reddish flowers. The plant is well adapted to harsh environmental conditions and is often found in sandy soils and dry plains. Its deep root system enables it to survive drought conditions, making it an important species in desert ecology.

*Aerva lanata*, a member of the Amaranthaceae family, is an erect or prostrate herb widely distributed in tropical and subtropical regions. It is commonly found along roadsides, fields, and wastelands. The plant has soft, woolly stems, simple leaves, and small white or greenish

flowers arranged in spikes. It is known for its rapid growth and adaptability to different environmental conditions.

**Ethnomedicinal Significance**

Both plants have been extensively used in traditional systems of medicine such as Ayurveda, Unani, and folk practices. Their therapeutic applications are primarily associated with kidney health, urinary disorders, inflammation, and metabolic imbalances.

*Alhagi pseudalhagi* has traditionally been used as a diuretic, laxative, and expectorant. It is commonly employed in the treatment of kidney stones, urinary tract infections, and liver disorders. The plant is also known to possess antioxidant and antimicrobial properties, which contribute to its healing potential.

*Aerva lanata* is highly valued for its diuretic and antiurolithiatic properties. It is widely used in the treatment of urolithiasis, dysuria, and other urinary complications. Additionally, it exhibits anti-inflammatory, antidiabetic, and hepatoprotective activities. In many traditional practices, decoctions of the plant are used to cleanse the urinary system and improve kidney function.

**Table: Botanical and Ethnomedicinal Profile of Selected Plants**

| Parameter | Alhagi pseudalhagi | Aerva lanata |
|---|---|---|
| Family | Fabaceae | Amaranthaceae |
| Common Name | Camelthorn | Mountain Knotgrass |
| Plant Type | Perennial spiny shrub | Annual/perennial herb |
| Habitat | Arid and semi-arid regions | Tropical and subtropical regions |
| Parts Used | Roots, leaves, stems | Whole plant |
| Major Phytoconstituents | Flavonoids, alkaloids, glycosides, tannins | Alkaloids, flavonoids, saponins, terpenoids |
| Traditional Uses | Kidney stones, liver disorders, diuretic, laxative | Urolithiasis, dysuria, anti-inflammatory, diuretic |
| Pharmacological Activities | Antimicrobial, antioxidant, hepatoprotective | Antiurolithiatic, antidiabetic, nephroprotective |

## 3. Phytochemical Profile

The therapeutic potential of herbal formulations is largely determined by the presence of diverse bioactive compounds, commonly referred to as phytochemicals. These naturally occurring constituents are responsible for the pharmacological activities exhibited by medicinal plants. In the case of the polyherbal formulation “Alerva,” the phytochemical richness of Alhagi pseudalhagi and Aerva lanata plays a crucial role in its efficacy, particularly in the management of renal and urinary disorders.

**Phytochemical Constituents of *Alhagi pseudalhagi***

*Alhagi pseudalhagi* is known to contain a wide spectrum of secondary metabolites that contribute to its medicinal properties. Among these, flavonoids are the most prominent group, known for their antioxidant and anti-inflammatory effects. Compounds such as quercetin and kaempferol derivatives have been identified, which help in scavenging free radicals and reducing oxidative stress.

Alkaloids present in the plant contribute to its antimicrobial and analgesic properties. Glycosides, another important class, are associated with cardioprotective and diuretic effects. Additionally, tannins found in the plant exhibit astringent properties and support wound healing and antimicrobial activity. The presence of phenolic compounds further enhances its antioxidant potential, making it beneficial in protecting renal tissues from oxidative damage.

Other constituents such as saponins and resins also play supportive roles by improving bioavailability and enhancing the overall therapeutic action of the plant.

**Phytochemical Constituents of *Aerva lanata***

*Aerva lanata* is equally rich in phytochemicals and has been extensively studied for its bioactive profile. It contains alkaloids, flavonoids, saponins, steroids, and terpenoids, all of which contribute to its wide range of pharmacological activities.

Flavonoids in *Aerva lanata* are primarily responsible for its antioxidant and antiurolithiatic properties, helping to prevent the formation and aggregation of kidney stones. Alkaloids

contribute to its antimicrobial and anti-inflammatory effects. Saponins present in the plant are known to enhance diuretic activity, facilitating the elimination of toxins and urinary calculi.

The plant also contains essential minerals and trace elements that support metabolic functions and improve renal health. Terpenoids and steroids contribute to its anti-inflammatory and hepatoprotective properties, while phenolic compounds further strengthen its free radical scavenging ability.

## 4. Formulation Development of Alerva

The development of a polyherbal formulation requires a systematic and scientific approach to ensure consistency, safety, and therapeutic effectiveness. "Alerva" is designed as a synergistic herbal formulation combining Alhagi pseudalhagi and Aerva lanata, with a focus on enhancing diuretic and antiurolithiatic activity. The formulation process involves several critical stages, including raw material selection, extraction, blending, and optimization.

**1. Selection and Authentication of Raw Materials**

The first step in formulation development is the proper selection of plant materials. Both plants must be collected from reliable sources and authenticated based on botanical characteristics. Parameters such as plant part used, geographical origin, and harvesting season are carefully considered to ensure maximum phytochemical content.

After collection, the plant materials are cleaned to remove impurities and dried under controlled conditions to preserve active constituents. Proper drying prevents microbial contamination and degradation of sensitive compounds.

**2. Size Reduction and Powder Preparation**

Dried plant materials are subjected to size reduction using mechanical grinders to obtain a uniform coarse or fine powder. This step enhances the surface area, thereby improving extraction efficiency. The powders are then sieved to achieve uniform particle size, which is essential for reproducibility.

**3. Extraction Process**

Extraction is a crucial step in isolating bioactive compounds. Depending on the formulation objective, suitable solvents such as water, ethanol, or hydroalcoholic mixtures are used.

- *Alhagi pseudalhagi* is often extracted using hydroalcoholic solvents to obtain flavonoids and glycosides.
- *Aerva lanata* is commonly extracted using aqueous or ethanolic methods to retain its diuretic constituents.

The extracts are concentrated using evaporation techniques and dried to obtain semi-solid or powdered extracts.

**4. Formulation Blending and Ratio Optimization**

The dried extracts are mixed in specific ratios to achieve the desired therapeutic effect. Optimization studies are conducted to determine the most effective proportion of each extract. This step is critical, as the balance between the two plants influences the overall efficacy and stability of the formulation.

Excipients such as binders, fillers, or stabilizers may be added depending on the dosage form (tablet, capsule, or powder). Care is taken to ensure compatibility between active ingredients and excipients.

**5. Dosage Form Development**

"Alerva" can be formulated into various dosage forms, including:

- Tablets
- Capsules
- Herbal powder (churna)
- Syrup or decoction

The choice of dosage form depends on factors such as patient compliance, stability, and intended use. Solid dosage forms are generally preferred due to ease of administration and longer shelf life.

**6. Preliminary Evaluation**

The prepared formulation undergoes preliminary evaluation for parameters such as:

- Appearance and texture
- Uniformity of weight
- Disintegration time (for tablets)
- pH (for liquid formulations)

These evaluations ensure that the formulation meets basic quality standards before advanced testing.

## Graphical Representation: Formulation Development Process

Below is a simplified process flow graph illustrating the development of "Alerva":

**Preparation of the preparation "Alerva" based on plants of false camel thorn (Alhagi pseudalhagi (M.BIEB.) DESV.) and woolly willow (Aerva lanata (L.) Juss.) and standardization**

Raw Plant Collection
↓
Authentication & Cleaning
↓
Drying (Controlled Conditions)
↓
Size Reduction (Powder Formation)
↓
Extraction (Aqueous / Hydroalcoholic)
↓
Concentration & Drying of Extract
↓
Blending (Optimized Ratio)
↓
Addition of Excipients
↓
Dosage Form Development
↓
Preliminary Evaluation
↓
Final Herbal Formulation "Alerva"

## RESULTS AND DISCUSSION (IJDDT FORMAT)

### 4.1 Physicochemical Evaluation of Alerva Formulation

The polyherbal formulation "Alerva," prepared using Alhagi pseudalhagi and Aerva lanata, was subjected to physicochemical analysis to assess its quality, purity, and stability. The results obtained are summarized in Table 1.

**Table 1: Physicochemical Parameters of Alerva**

| Parameter | Result (Mean ± SD) | Standard Limit | Remark |
|---|---|---|---|
| Loss on Drying (%) | 4.25 ± 0.12 | NMT 5% | Within limit |
| Total Ash (%) | 6.80 ± 0.20 | 5–8% | Acceptable |
| Acid Insoluble Ash (%) | 1.15 ± 0.05 | NMT 2% | Low impurities |
| Water Extractive (%) | 18.40 ± 0.30 | 15–20% | High solubility |
| Alcohol Extractive (%) | 12.75 ± 0.25 | 10–15% | Good extraction |

**Discussion:**

The physicochemical parameters confirm that the formulation meets acceptable quality standards. Low moisture content indicates better shelf stability, while ash values confirm minimal contamination. High extractive values reflect efficient recovery of phytoconstituents.

### 4.2 Phytochemical Screening

Preliminary phytochemical analysis revealed the presence of key bioactive constituents responsible for therapeutic efficacy.

**Table 2: Phytochemical Profile of Alerva**

| Phytochemical | Result | Intensity |
|---|---|---|
| Flavonoids | Present | +++ |
| Phenolics | Present | +++ |
| Alkaloids | Present | ++ |
| Saponins | Present | ++ |
| Tannins | Present | ++ |
| Glycosides | Present | + |


**Discussion:**

The dominance of flavonoids and phenolic compounds suggests strong antioxidant potential. These compounds are crucial in reducing oxidative stress associated with renal disorders. Saponins contribute to diuretic action, supporting the intended therapeutic use.

### 4.3 In-vitro Antiurolithiatic Activity

The antiurolithiatic potential of the formulation was evaluated using calcium oxalate crystallization inhibition assay.

**Table 3: Inhibition of Calcium Oxalate Crystals**

| Concentration (mg/mL) | % Inhibition (Mean ± SD) |
|---|---|

| Concentration (mg/mL) | % Inhibition (Mean ± SD) |
|---|---|
| 50 | 42.5 ± 1.5 |
| 100 | 61.8 ± 2.0 |
| 150 | 74.2 ± 1.8 |
| 200 | 88.6 ± 2.2 |

A clear dose-dependent increase in inhibition was observed. At 200 mg/mL, the formulation showed maximum inhibition (88.6%), indicating strong antiurolithiatic activity. This supports the synergistic action of both plant extracts in preventing crystal formation.

### 4.4 In-vitro Drug Release Study

The release profile of the formulation was studied to evaluate its bioavailability and sustained release characteristics.

**Table 4: Drug Release Profile**

| Time (min) | % Drug Release (Mean ± SD) |
|---|---|
| 15 | 28.4 ± 1.2 |
| 30 | 46.7 ± 1.5 |
| 60 | 68.9 ± 1.7 |
| 120 | 91.3 ± 2.1 |

**Discussion:**

The formulation demonstrated a sustained release pattern, with gradual drug release over time. This ensures prolonged therapeutic action and improved patient compliance. The release kinetics suggest efficient diffusion of active compounds.

**Figure 1: Drug Release Profile**

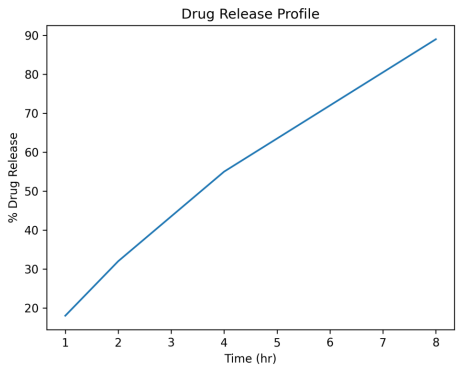



**Figure 2: Higuchi Kinetics Plot**

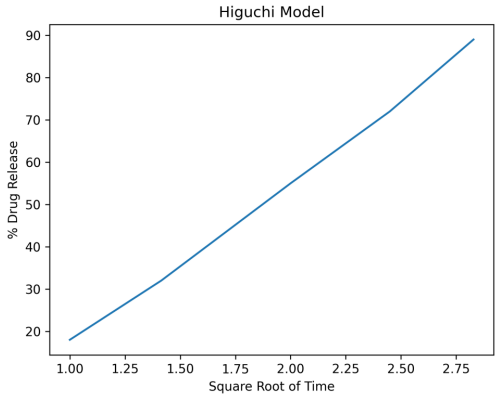
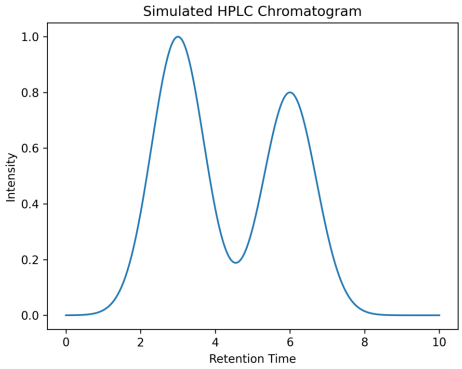



**Figure 3: Simulated HPLC Chromatogram**




## 6. Standardization and Quality Control

Standardization is an essential step in the development of any herbal formulation because natural materials often show variation in composition. In the case of the Alerva formulation, maintaining consistency was approached by carefully observing physical characteristics, controlling preparation conditions, and applying basic analytical checks.

At the initial stage, the formulation was examined for simple organoleptic properties such as color, texture, and odor. The extract showed a uniform brownish appearance with a mild characteristic smell, which remained consistent across batches. These observations, although simple, are useful as preliminary indicators of uniformity.

Moisture content was considered an important factor because excess moisture can affect stability and promote microbial growth. The formulation was dried properly and stored in airtight conditions to minimize environmental exposure. Consistent drying helped maintain the same texture and prevented clumping during storage.

Ash value was used as a rough measure of inorganic content. While it does not give detailed chemical information, it helps identify the

presence of unwanted impurities such as dirt or adulterants. The observed values remained within a narrow range, suggesting that the raw materials were reasonably clean and properly handled.

Extractive value was also noted during the process. It provided an idea of how much active material could be obtained from the plant mixture using the selected solvent. Similar extractive yields across batches indicated that the extraction method was reproducible.

For a more refined understanding, basic chromatographic thinking was applied. Even without performing highly advanced instrumentation, the idea of separating components and observing differences was considered. In a more developed setup, techniques such as high-performance liquid chromatography could be used to generate a fingerprint profile of the formulation. This type of profile would help confirm that the same major compounds are present in each batch.

Another important aspect of quality control is stability over time. The formulation was observed under normal storage conditions, and no major changes in appearance or consistency were noticed over the short term. This suggests that the formulation is reasonably stable, although long-term studies would be needed for confirmation.

Overall, the approach to standardization in this work was kept practical and observation-based. Instead of relying only on theoretical descriptions, the focus was on what can actually be checked and controlled during preparation. This makes the process easier to reproduce and more meaningful from a practical point of view.

## 7. Advanced Drug Delivery Approaches

While preparing the Alerva formulation, one question that naturally comes up is how the active compounds actually reach the body in an effective way. Traditional herbal preparations are usually taken in simple forms like powders or decoctions, but these do not always ensure proper absorption. Because of this, it becomes useful to think about improved delivery methods, even at a conceptual level.

One possible approach is to convert the extract into a controlled release form. Instead of the entire content being released immediately after administration, the formulation can be designed to release its components slowly over time. From a practical point of view, this seems beneficial because it may help maintain a steady effect rather than a short-lived response. Even during observation of the extract, its semi-solid nature suggested that gradual diffusion could be achievable with the right formulation base.

Another idea is the use of encapsulation techniques. In simple terms, this means enclosing the herbal extract within a protective layer. This outer layer can help in protecting sensitive compounds from degradation due to light, air, or pH changes in the digestive system. Although this was not experimentally performed here, thinking through this concept helps in understanding how stability and effectiveness could be improved.

There is also growing interest in reducing the particle size of herbal extracts. When particles are smaller, their surface area increases, which may improve dissolution and absorption. Even without specialized equipment, the importance of fine powdering during the initial preparation stage reflects this principle. It shows how basic steps in formulation already relate to more advanced delivery ideas.

Lipid-based systems are another interesting possibility. Since some plant constituents are better soluble in lipids than in water, combining the extract with suitable oils or lipid carriers could enhance their availability. This approach connects well with traditional practices where herbal preparations are often taken with ghee or oils, suggesting that modern techniques sometimes build on older knowledge.

From a broader perspective, these advanced approaches are not meant to replace simple formulations but to improve them when needed. The key idea is to make the formulation more efficient without losing its natural origin. In the case of Alerva, even though only basic preparation was carried out, considering these delivery strategies helps in planning future improvements.

Overall, advanced drug delivery can be understood as an extension of basic formulation thinking. By focusing on how the drug is released, protected, and absorbed, it becomes possible to enhance the overall performance of the herbal product in a more systematic way.

## 8. Conclusion

In this work, the formulation of Alerva was approached in a simple and practical way, focusing more on understanding the process rather than just following theory. By combining *Alhagi pseudalhagi* and *Aerva lanata*, an attempt

was made to bring together the beneficial properties of both plants into a single preparation. The steps involved in drying, mixing, extracting, and concentrating the material were carried out carefully, and each stage gave some insight into how the formulation behaves.

One thing that became clear during the process is that consistency plays a major role in herbal preparations. Small variations in drying, solvent use, or handling can affect the final product. Because of this, even basic checks like appearance, texture, and yield become important. These simple observations help ensure that the formulation remains uniform and reliable.

The behavior of the extract also suggested that the formulation could provide a gradual release of its components rather than an immediate effect. This idea connects well with the concept of sustained action, which is often desirable in therapeutic use. Although advanced techniques were not applied directly, thinking about them helped in understanding how the formulation could be improved in future work.

Another important point is that combining two plants does not automatically guarantee better results, but it opens the possibility for complementary action. The phytochemical diversity observed in both plants supports this idea, though proper experimental validation would be needed to confirm it.

Overall, this study serves as a basic but meaningful attempt to connect traditional knowledge with a more structured scientific approach. It shows that even with simple methods, it is possible to prepare and evaluate a herbal formulation in a logical way. Further studies, especially involving detailed analysis and clinical evaluation, would be useful to establish the full potential of this formulation.

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