



**INTERNATIONAL JOURNAL OF  
PHARMACEUTICAL SCIENCES**  
[ISSN: 0975-4725; CODEN(USA): IJPS00]  
Journal Homepage: <https://www.ijpsjournal.com>



## Review Article

# Natural Ingredients as Excipients in Ayurvedic Suspensions: A Comprehensive Review

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## ARTICLE INFO

Published: 17 Dec 2025

### Keywords:

Ayurvedic Suspension,  
Biphasic liquid dosage  
forms, Suspending agents,  
Flocculating agents,  
dispersion media.

### DOI:

10.5281/zenodo.17967009

## ABSTRACT

In Biphasic liquid dosage forms, the Ayurvedic suspensions, offer minimal adverse effects and have therapeutic action with the aid of natural ingredients in order to provide superiority to synthetic materials. Excipients play vital roles that may affect quality and administration characteristics by bringing in stability, efficacy, drug acceptability and compliance. Increasing uses of natural products in an Ayurvedic formulation are due to their nontoxicity, biocompatibility, biodegradability, economic status, and availability. Natural polymers, such as gums and mucilages, include Acacia, tragacanth, and starch, which perform multi productive tasks in the suspension as suspending agents, thickening agents, stabilizers, and emulsifying agents in order to prevent aggregation of the drug particles and ensure dispersion of particulate matter. Additional excipients, including honey and fruit extracts, enhance sweetness and flavor and thereby increase palatability and acceptability in patients, particularly for pediatric and geriatric applications. Traditional Ayurvedic formulations involve these natural excipients that might act as bioenhancers or "Yogavahi" and thereby improve the bioavailability and absorption of active ingredients. Even though natural excipients provide stability and effectiveness to the formulation, they may also introduce certain problems such as microbial contamination and variability due to environmental factors were tend to be seen often. This demands very careful processing and preservation methods for such excipients. Their therapeutic potential and multifunctional task significantly contributes to the effectiveness of Ayurvedic suspensions.

## INTRODUCTION

Ayurveda, the traditional Indian system of medicine, advocates a holistic approach toward

health with natural remedies obtained from plant, animal, and mineral sources. Through the centuries, Ayurvedic pharmaceuticals (Bhaishajya Kalpana) has laid down an array of dosage forms

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**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



to ensure the stability, palatability, and therapeutic efficacy of medicinal formulations. Of these, suspensions-like preparations such as Avaleha, Asava–Arishta, and Kashaya assume great importance because of their capability to provide both soluble and insoluble phytoconstituents in bioavailable form.<sup>1</sup> The excipients in any suspension play a critically important role in the physical stability, appearance, taste, and release profile of the active ingredients. Modern pharmaceuticals may use various synthetic excipients, but Ayurveda traditionally uses natural ingredients as multifunctional excipients with added therapeutic value. Honey, ghee, jaggery, cardamom, cinnamon, turmeric, hibiscus and plant mucilage, starches, gums, and resins are some of the common natural suspending agents, stabilizers, sweeteners, or preservatives used in Ayurveda. And lemon juice, tamarind pulp were used as buffering agents in order to balance the Ph changes overtime. These ingredients contribute not only to the pharmaceutical properties of the formulation but also to its therapeutic potential with their antioxidant, immunomodulatory, and nutritive effects.<sup>2</sup>

There is a growing scientific interest in the investigation of natural excipients as biocompatible, safer, and environmentally friendly alternatives to synthetic additives. This trend reflects the increasing focus on green pharmacy and the use of raw materials from natural and renewable sources for the development of dosage forms. Knowledge of the functional and therapeutic roles of these natural excipients in Ayurvedic suspensions bridges traditional knowledge with modern pharmaceuticals, thus supporting the development of standardized, stable, and patient-friendly herbal dosage forms.<sup>3</sup> Therefore, this review outlines the diverse natural excipients applied in Ayurvedic suspensions, drawing on their pharmaceutical functions,

physicochemical properties, antioxidant potential, and compatibility with active scientific validation of these traditional excipients toward their inclusion in modern herbal drug formulations.<sup>4</sup>

### Advantages

- Natural excipients are biodegradable and have no negative effects on people.
- Compared to synthetic materials, they are more affordable and have lower production costs.
- They are non-toxic and biocompatible.<sup>5</sup>
- Since the majority of these plants' constituents are carbohydrates, which are naturally occurring repeating monosaccharide units, they are not poisonous.
- They are risk-free and have no unfavorable effects because they originate from a natural source.
- They are produced in numerous countries because of their use by humans.<sup>6</sup>
- Greater public acceptance and tolerance for patients they have positive psychological impact and aesthetically perishing Medication with an unpleasant and bitter taste can be administered via sweetened, coloured, and flavor carriers.<sup>7</sup>
- Particularly for kids and others who have trouble swallowing, suspension may be simpler to take than tablets or capsules.
- Natural excipients are more readily accessible from a variety of natural resources.
- The excipients are necessary to guarantee the formulation's correct delivery, stability, and safety.<sup>8</sup>

### Disadvantages

- Microbial contamination: Because they are exposed to the outside world during manufacture, there is a possibility of microbial contamination.<sup>9</sup>



- **Variation:** While the formation of natural polymers depends on the environment and a number of physical parameters, synthetic manufacturing is a controlled process with defined quantities of materials.
- **The unchecked pace of hydration**—Because variations in the assortment of natural materials at various periods, in addition to variations in climate, species, and geography<sup>10</sup>
- **When the proportion of chemical components found in a particular substance may differ.**
- **Slow Process:** The production rate is unchangeable because it depends on the environment and numerous other factors. Therefore, the manufacturing of natural polymers is slow.<sup>11</sup>
- **Heavy metal contamination:** Herbal excipients are frequently linked to the possibility of heavy metal contamination.
- **The production of natural excipients proceeds very slowly.**
- **Environmental, geographical, and climatic factors influence the generation of natural excipients.**<sup>12</sup>

### Ideal Properties

Across all types of excipients, the following properties are considered ideal for natural sources:

- **Pharmacologically inert:** They should not have any therapeutic effect on the patient.
- **Non-toxic and safe:** They should not cause any adverse effects or side effects in humans, a primary advantage over some synthetic options.
- **Biocompatible and biodegradable:** Being of natural origin, they are generally well-tolerated by the body and the environment.
- **Stable:** They must be chemically and physically stable under normal conditions of

use and storage (e.g., unaffected by light, temperature, or hydrolysis).

- **Compatible:** They should not interact with the API or other excipients in the formulation.
- **Easily available and cost-effective:** Natural sources often provide a more economical alternative to synthetic materials.
- **Acceptable organoleptic properties:** They should ideally be free from objectionable colour, odour, or taste, or be able to effectively mask the unpleasant properties of the API.
- **Microbial quality:** Natural materials must be processed to ensure minimal microbial and heavy metal contamination, which can be a potential challenge with natural sources.



- **Functions:** As Like modern excipients, they are used to:
  - Create the final dosage form.
  - Enhance dissolution and bioavailability.
  - Improve bulkiness and disintegration.
  - Stabilize the active ingredient.
  - Influence the drug's pharmacokinetic and pharmacodynamic properties.

### Examples of Ayurvedic Suspensions

#### 1. Ashwagandha Suspension

- **Contains:** Ashwagandha churna (Withania somnifera)

- **Use:** Adaptogen, stress relief, strength promoter.

## 2. Trikatu Suspension

- **Contains:** Black pepper, long pepper & ginger powder
- **Use:** Enhances digestion, improves bioavailability.

## 3. Guduchi Suspension

- **Contains:** Tinospora cordifolia powder
- **Use:** Immunity booster, antipyretic.

## 4. Triphala Suspension

- **Contains:** Haritaki, Bibhitaki, Amalaki powder
- **Use:** Digestive health, detoxification.

## 5. Shankhpushpi Suspension

- **Contains:** Convolvulus pluricaulis powder
- **Use:** Memory booster, reduces anxiety.

## 6. Neem Suspension

- **Contains:** Azadirachta indica leaf or bark powder
- **Use:** Blood purifier, antibacterial.

## 7. Yashtimadhu Suspension

- **Contains:** Glycyrrhiza glabra powder
- **Use:** Ulcers, sore throat.

## 8. Gokshura Suspension

- **Contains:** Tribulus terrestris powder
- **Use:** Kidney health, aphrodisiac.

## 9. Arjuna Suspension

- **Contains:** Terminalia arjuna bark powder
- **Use:** Cardioprotective.

## 10. Turmeric Suspension

- **Contains:** Curcuma longa powder
- **Use:** Anti-inflammatory, antioxidant.

## Classification of Excipients :



## 1. Suspending agents :



The suspending agents in Ayurvedic suspensions are natural additives mixed into the liquid formulations to prevent settling of active ingredients. They raise the viscosity of the liquid medium and form a film around the solid particles that prevents aggregation and caking of suspension, thus allowing uniform distribution and easy redispersion by shaking.<sup>13</sup>

**Acacia gum** : It was a dried gummy exudate obtained from the stems and branches of

*Senegalia senegal* & *Vachellia seyal*, Belongs to *Leguminosae* family.

**Tragacanth gum** : It was obtained from the air-dried, gummy exudate of several species of *Astragalus* trees, primarily from the genus *astragalus gummifier*, etc.<sup>14</sup>

**Agar**: It was a gelatinous polysaccharide obtained from the cell walls of these seaweeds of *Agarophytes* as species, belongs to *Rhodophyceae* family.<sup>15</sup>



**Acacia**



**Tragacanth**

## 2. Wetting agents :

The wetting agents in Ayurvedic suspensions are substances used to enhance the dispersion of solid herbal particles in a liquid medium by reducing surface tension, ensuring uniform dispersion, accurate dosing, and proper absorption.<sup>16</sup>

**Lecithin** : It functions as a natural emulsifier and stabilizing agent and provides wetting properties

to the suspensions, helping to prevent the separation of the composition and ensuring a uniform product. It was obtained from soya beans, sunflower seeds and egg yolks.

**Aloevera mucilage** : It was a clear, jelly textured substance obtained from inner leaf of *Aloe barbadensis miller* of *Asphodelaceae* family.<sup>17</sup>



**Lecithin**



**Aloe vera**

### 3. Sweetening Agents :

The primary pharmaceutical role is to mask the inherently bitter, acrid, or nauseous taste of some herbal ingredients and active pharmaceutical ingredients (APIs), making the medicine more acceptable, especially for pediatric and geriatric patients.<sup>18</sup>

**Honey** : Honey is produced by various species of honey bees, including *Apis Melifera*, *Apis dorsata*, *Apis florea* and *Apis indica*, which belong to the *Apidae* family.

**Stevia** : It was a natural sweetener obtained from the plant *Stevia rebaudiana*, and it belongs to the *Asteraceae* family.<sup>19</sup>



**Honey**



**Stevia**

### 4. Flavouring / Aromatic Agents :

These are extensively used to mask the unpleasant taste and odor of medicinal ingredients, thus improving patient compliance and acceptability. These agents are vital for organoleptic (sensory) appeal, especially in liquid dosage forms that remain in contact with the taste buds for a longer time.<sup>20</sup>

**Cinnamon** : the dried inner bark of the shoots from trees of the genus *Cinnamomum* primarily *Cinnamomum zeylanicum*, belongs to the *Lauraceae* Family.

**Mint** : it was the leaf and stems obtained from the plant genus *Mentha*, belongs to *Lamiaceae* family.

**Rose** : It was obtained from the plant Genus *Rosa* belongs to *Rosaceae* family.<sup>21</sup>



**Mint**



**Rose**

### 5 . Preservatives :

Preservatives in Ayurvedic suspensions are primarily used to prevent microbial

contamination, inhibit degradation, and significantly extend the product's shelf life. This ensures the medicine retains its intended potency, quality, and safety for the consumer throughout its period of time.<sup>22</sup>

**Tulsi** : Tulsi contains bioactive compounds like eugenol, carvacrol, and caryophyllene, which

exhibit strong antibacterial, antiviral, and antifungal activity.(Ocimum Sanctum Linn).<sup>23</sup>

**Neem** : Neem contains numerous bioactive compounds, such as nimbin, nimbidin, azadirachtin, and nimbolide, which were used to produce antifungal and antibacterial activity.(Azadirachta Indica).<sup>24</sup>



**Tulsi**



**Neem**

## 6. Stabilizers / Flocculating Agents :

Stabilizers and flocculating agents are used to ensure the physical stability and consistent dosing of Ayurvedic suspensions by controlling particle behavior. They prevent the active herbal ingredients from settling into a compact, non-redispersible mass (caking).<sup>25</sup>

**Methi** : It was primarily serves as a demulcent, thickening, and stabilizing agent obtained from dried seeds of the plant *Trigonella foenum-graecum* belongs to *Fabeaceae* family.

**Gelatin** : it was obtained from animal collagen, primarily from the skin, bones, and connective tissues of pigs and cattle after the treatment to remove the unwanted & toxic materials.<sup>26</sup>



**Gelatin**



**Methi (Fenugreek)**

## 7. Buffering Agents :

Buffering agents play a crucial role in stabilizing the pH of the formulation, which in turn ensures



the chemical stability of the active ingredients, maintains their solubility, and enhances patient comfort by minimizing irritation.

It includes Aloe vera gel juice, triphala etc.<sup>27</sup>

**Lemon Juice** : It was the acidic juice obtained from the fruit of the tree *Citrus limon* , which belongs to the *Rutaceae* family.

**Tamarind Pulp** : It was the pulp extract of tamarind from *Tamarindus indica* L., a leguminous tree belonging to the *Fabiaceae* family.<sup>28</sup>



**Lemon extract**



**Tamarind pulp**

## 8. Anti-Oxidants :

Antioxidants inhibit unstable molecules (free radicals) produced in the body, which can damage cells and lead to chronic diseases, aging, and inflammation. It also prevents the oxidation of pharmaceutical ayurvedic suspensions which leads to a longer shelf life.<sup>29</sup>

**Amla** : It was the fresh (or) dried fruit of the plant *Phyllanthus emblica* Linn /*Emblica officinalis* Gaertn, belongs to the *Euphorbiaceae* family.

**Aswagandha** : It is the dried root and stem bases of the plant *Withania Somnifera* (L.) Dunal, which belongs to the *Solanaceae* family.

**Haritaki** : It was The medicinal part of mature, dried fruit of the species of flowering evergreen tree *Terminalia chebula* Retz, belonging to the *Combretaceae* family.<sup>30</sup>



**Amla**



**Ashwagandha**





**Haritaki**

## CONCLUSION :

The use of natural excipients in Ayurvedic suspensions is not only consistent with the concept of complete health but also improves the efficacy, safety, and acceptability of the pharmaceutical formulation. The dependence on non-toxic and biodegradable materials from nature itself underlines a careful transition toward sustainable practices in the development of pharmaceuticals. While the benefits of such natural excipients are impressive, there is also a need to be realistic regarding their challenges, including susceptibility to microbial contamination and assurance of quality variation. Ongoing research and improvement in processing techniques will be part of dealing with these drawbacks and ensuring that the rich heritage of Ayurvedic medicine is preserved into the stringent demand of modern-day pharmaceutical standards. By linking the wisdom of traditional medicine with current scientific validation, we move into the future of herbal medicine, ensuring more accessibility and efficacy for a wide range of patients. Further research into the interplay between ancient wisdom and modern technology means that the potential for Ayurvedic suspensions containing natural excipients is unlimited.

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**HOW TO CITE:** I. Devendar, P. Yugandhar, M. Sowjanya, Sk. Fathima, M. Sai Durga, Devani Rama Chakradhar, Natural Ingredients as Excipients in Ayurvedic Suspensions: A Comprehensive Review, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 12, 2789-2798. <https://doi.org/10.5281/zenodo.17967009>

