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Review Article

Analytical Standardization of Ajitadi Agad: A Classical Polyherbal Antidote in Light of Contemporary Parameters

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Abstract

Background: *Agada Tantra*, one of the eight specialties of Ayurveda, emphasizes management of poisoning through polyherbal formulations known as *Agada*. *Ajitagada*, is described in *Ashtanga Sangraha Uttarasthana* (40/101) as a classical formulation indicated in the treatment of *Sthavara* (plant/mineral-origin) and *Jangama* (animal-origin) poisons. It contains *Vidanga (Embelia ribes)*, *Patha (Cissampelos pareira)*, *Triphala (Amalaki, Haritaki, Bibhitaki)*, *Ajmoda (Carum roxburghianum)*, *Hingu (Ferula asafoetida)*, *Chitraka (Plumbago zeylanica)*, *Tagara (Valeriana wallichii)*, *Sunthi (Zingiber officinale)*, *Maricha (Piper nigrum)*, *Pippali (Piper longum)*, and salts (*Lavana Varga*). Objective: To evaluate *Ajitagada* using modern analytical parameters, including pharmacognostical, physicochemical, and organoleptic evaluation, in order to establish quality standards and scientific validation for global acceptance. Materials and Methods: *Ajitagada churna* was prepared as per classical guidelines of *Sharangadhara Samhita*. Raw materials were authenticated through macroscopic and microscopic methods, and processed individually before formulation. Analytical studies included organoleptic evaluation, physicochemical constants (pH, loss on drying, ash values, water-soluble and alcohol-soluble extractives). Results: *Ajitagada* exhibited characteristic organoleptic features such as brownish appearance, pungent odor, and astringent-pungent taste. Physicochemical analysis confirmed acceptable quality parameters: moisture content within permissible limits, ash values indicative of mineral content, and satisfactory extractive values. Preliminary phytochemical screening revealed the presence of alkaloids, tannins, glycosides, flavonoids, and saponins, aligning with the formulation's traditional *Vishaghna* (anti-toxic) claims. Conclusion: The analytical evaluation of *Ajitadagada* provides preliminary validation for its identity, purity, and quality. These findings strengthen its classical claims as an antidotal formulation and establish a baseline for future pharmacological and clinical investigations.

Keywords: *Ajitagada, Agada Tantra,* Analytical study, Pharmacognosy, Standardization, *Vishaghna*.

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Introduction

Ayurveda, the ancient system of Indian medicine, recognizes *Agada Tantra* (toxicology) as one of its eight clinical branches (*Ashtanga Ayurveda*). It emphasizes the management of poisoning caused by *Sthavara* (plant/mineral-origin toxins), *Jangama* (animal-origin toxins), and *Krtrima Visha* (artificially prepared toxins) through specialized polyherbal formulations termed *Agada* (1,2). These formulations are not only detoxifying but also possess *Rasayana* (rejuvenative), *Krimighna* (anthelmintic), and *Jwaraghna* (antipyretic) properties, contributing to their wide therapeutic relevance (3).

Among the various formulations described in the classical texts, *Ajitagada* is cited in *Ashtanga Sangraha Uttarasthana* (40/101). The verse describes its role as *Vishasamshamana* (antidotal) in both *Sthavara* and *Jangama Visha*. The formulation comprises *Vidanga (Embelia ribes Burm. F) Patha (Cissampelos pareira L.)*, *Triphala (Terminalia chebula Retz. Terminalia bellirica (Gaertn.) Roxb.Phyllanthus emblica L.) Ajmoda (Carum roxburghianum (DC.) Benth. & Hook. f.)*, *Hingu (Ferula asafoetida L)*, *Chitraka (Plumbago zeylanica L.)*, *Tagara (Valeriana wallichii DC.)*, *Sunthi (Zingiber officinale Roscoe)*, *Maricha (Piper nigrum L.)*, *Pippali (Piper longum L.)*, and *Lavana Varga* (various salts) (4). Each ingredient has been scientifically reported to possess antioxidant, anti-inflammatory, hepatoprotective, and nephroprotective activities (5–8).

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Standardization and analytical validation of Ayurvedic formulations are crucial for ensuring quality, purity, and reproducibility, especially in the context of global acceptance. The World Health Organization (WHO) emphasizes the importance of pharmacognostical, physicochemical, and chromatographic evaluations to establish identity, safety, and efficacy of traditional medicines (9). Previous research on classical *Agada* formulations has highlighted the need for comprehensive analytical profiling to bridge traditional wisdom with modern pharmacological insights (10).

In this background, the present study aims to carry out a systematic analytical evaluation of *Ajitagada* through pharmacognostical, organoleptic, physicochemical, and phytochemical parameters. This work is expected to provide a scientific foundation for its therapeutic claims and ensure its standardization as per international quality benchmarks.

Materials and Methods

Pharmaceutical Preparation

Raw Material Procurement & Authentication:

Seventeen ingredients were procured from certified Ayurveda herbal suppliers. Botanical authentication of each *Vidanga* (*Embelia ribes*), *Patha* (*Cissampelos pareira*), *Triphala* (comprising *Haritaki*, *Amalaki*, *Bibhitaki*), *Ajmoda* (*Carum roxburghianum*), *Hingu* (*Ferula asafoetida*), *Chitraka* (*Plumbago zeylanica*), *Tagara* (*Valeriana wallichii*), *Sunthi* (*Zingiber officinale*), *Marich* (*Piper nigrum*), *Pippali* (*Piper longum*), and four salts (*Lavana Varga*) was done at *Sheetal Analytical Laboratory, lokmanya nagar, Pune* and confirmed using macroscopic and microscopic techniques following Ayurvedic Pharmacopoeia of India and WHO guidelines (11,12).

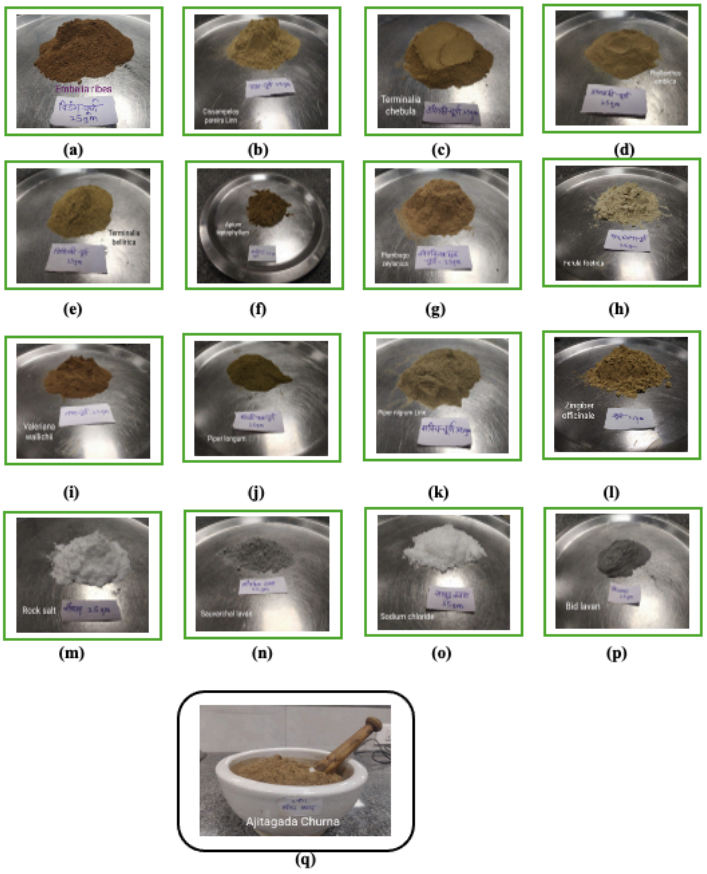
Table 2: Table Showing Ingredients of *Ajitagada*

Sr. No.	Name of the Raw material	Latin Name	Quantity
1	*Vidanga Phala*	*Embelia ribes*	1 Part
2	*Patha Mula*	*Cissampelos pareira*	1 Part
3	*Haritaki Phala*	*Terminalia Chebula*	1Part
4	*Amalaki Phala*	*Phyllanthus Embelica*	1 Part
5	*Bibhitaki Phala*	*Terminalia Belerica*	1 Part
6	*Ajmoda phala*	*Carum roxburghianum*	1Part
7	*Shweta Chitrak Mula*	*Plumbago zeylanica*	1 Part
8	*Hingu Niryasa*	*Ferula asafoetida*	1 Part
9	*Tagar Mula*	*Valeriana wallichii*	1 Part
10	*Pimpli Phal*	*Piper Longum*	1 Part
11	*Maricha Phal*	*Piper Nigrum*	1Part
12	*Sunthi rhizhome*	*Zingiber Officinalis*	1Part
13	*Saindhav Lavana*	Rock Salt	1 Part
14	*Sauvarchal Lavana*		1 Part
15	*Samudra Lavana*	Sea Salt	1 Part
16	*Bidlavana*		1 Part

Formulation Protocol

Each component was shade-dried, pulverized using a mechanical grinder, and passed through an 80-mesh sieve. Equal parts of all ingredients were mixed uniformly in a mass mixer. The resultant *Ajitagada* churna was stored in airtight amber glass jars at room temperature until analysis (13).

[Figure 1: a-*Vidanga, b-Patha, c-Haritaki, d-Amalaki, e-Bibhitaki, f-Ajamaoda, g-Shweta chitraka, h-hingu, i-Tagar, j-pippali, k-Marich, l-Shunthi, m-saindhav lawan, n-saurvachal lawan, o-samudra lawan, p-bid lawan, q-Ajitagada churna*]



Analytical Evaluation

Organoleptic Assessment:

Standardized sensory parameters were documented in accordance with WHO guidelines for quality control of herbal medicines.

- *Rupa* (colour)
- *Gandha* (odour)
- *Rasa* (taste)
- *Sparsha* (touch), and
- *Shabda* (sound) in accordance with WHO norms for herbal products.(12)

Physicochemical Analysis (performed in triplicate):

- Loss on Drying *(LOD)* at 110 °C using a calibrated hot-air oven. "Although API recommends 105 °C for LOD determination, a drying temperature of 110 °C was used to prevent thermal degradation of sensitive constituents (14)
- Total Ash and Acid-Insoluble Ash evaluated using muffle furnace and HCl-wash method as per API standards (15)

- Water and Alcohol-Soluble Extractive Values determined by macerating 5 g in appropriate solvent, followed by filtration and residue weight measurement (16)
- pH Measurement using a digital pH meter on a 10% w/v aqueous solution.

Results

Organoleptic Characteristics

The prepared *Ajitagada Churna* was evaluated for classical sensory attributes. The formulation exhibited a characteristic colour (*Rupa*), odour (*Gandh*a), taste (*Rasa*), texture (*Sparsha*), and sound (*Shabda*) on handling. (17, 18).The details are summarized in Table 3.

Table 3: Organoleptic parameters of *Ajitagada*

Sr no.	Parameter	Classical Reference (Expected)
1	*Rupa (Colour)*	*Brownish Grey /Herbal shade*
2	*Gandha (Odor)*	*Characteristic aromatic*
3	*Rasa (Taste)*	*Lawan-Katu, Lawan dominant*
4	*Sparsha (Touch)*	*Fine powdery texture*
5	*Shabda (Sound)*	*Crisp on handling*

Physicochemical Parameters

Standard analytical parameters were evaluated to establish preliminary quality standards. These included loss on drying at 110 °C, total ash, acid-insoluble ash, water-soluble extractive, alcohol-soluble extractive, and pH of the aqueous suspension. (19,20). All parameters were measured in triplicate, and mean values are presented in Table 4.

Table 4: Physicochemical parameters of *Ajitagada*

Parameter	Result	Permissible Range (API/WHO)
Loss on drying at 110 °C (%)	2.30%	Not more than 12%
Total Ash (%)	1.18%	5–15%
Acid-insoluble ash (%)	0.07%	<2%
Water-soluble extractive (%)	46.4%	10–25%
Alcohol-soluble extractive (%)	4.8%	5–20%
pH (10% aqueous solution)	6.25	4.5–7.0

"The physico-chemical parameters of *Ajitagada* (LOD, total ash, acid-insoluble ash, water- and alcohol-soluble extractives, pH) were determined and compared with the permissible ranges reported in API (2023) and WHO (2019) monographs. Individual drug components were analyzed for LOD and ash content, showing minor variations after formulation, indicating successful incorporation without significant degradation.

"This study represents a part of ongoing PhD research. The present work focuses on preliminary physico-chemical evaluation of *Ajitagada* as an extract of the larger study. Detailed Animal experimental investigations, including advanced chromatographic analyses (TLC/HPTLC) and individual drug parameter profiling, are being conducted as part of the full PhD work and will be reported subsequently."

Compliance with Quality Standards

All obtained values were within permissible limits recommended by the Ayurvedic Pharmacopoeia of India (API) and WHO guidelines for quality control of herbal materials, indicating the authenticity and purity of the prepared formulation (19, 20).

Discussion

The analytical evaluation of *Ajitagada* established preliminary standards for quality control and authenticated the classical formulation using modern parameters. The organoleptic features such as colour, taste, and odour were consistent with descriptions in Ayurvedic texts, reflecting the correct preparation method and preservation of phytoconstituents (21, 22).

The physicochemical parameters including loss on drying, ash values, and extractive values fell within permissible limits of the Ayurvedic Pharmacopoeia of India (API) and WHO guidelines (23,24). A low loss on drying indicates minimal moisture, reducing microbial growth and enhancing shelf stability. Ash values revealed the presence of inorganic matter within acceptable ranges, suggesting purity and absence of adulterants. Extractive values confirmed the presence of both water- and alcohol-soluble phytoconstituents, indicating a broad spectrum of active principles. These classes of compounds are reported to exhibit antioxidant, nephroprotective, and detoxifying properties (25,26). Such findings align with the traditional claim of *Ajitagada* as a *Vishaghna yoga* (anti-toxic formulation) for both *Sthavara* (plant/ mineral) and *Jangama visha* (animal toxins), as mentioned in *Astanga Sangraha* (27).

Comparatively, previous analytical studies on formulations like *Panchashirishadi Agada* and *Vishaghna Yoga* demonstrated similar phytoconstituents contributing to their protective activities (28, 29). This supports the rationale of employing *Ajitadagada* in conditions of oxidative stress and toxin-induced organ damage, including nephrotoxicity. Overall, the analytical profile provides a scientific basis for further preclinical and clinical exploration, particularly in models of cisplatin-induced nephrotoxicity, where individual ingredients (e.g., *Embelia ribes*, *Cissampelos pareira*, *Triphala*) have already demonstrated nephroprotective potential (30,31,32).

Conclusion

The present analytical study successfully established preliminary quality control parameters of *Ajitadagada* using organoleptic and physicochemical evaluation. Results confirm that the formulation adheres to classical standards and modern pharmacopeial limits, strengthening its authenticity and reproducibility.

Future Directions

- In-depth pharmacological validation using preclinical nephrotoxicity models.
- Standardization through HPTLC/HPLC fingerprinting for phytoconstituents.
- Exploration of toxicological safety through acute and chronic toxicity studies.
- Clinical trials to evaluate nephroprotective and *vishaghna* efficacy in human subjects.

Limitations

- The study was limited to basic analytical parameters without advanced chromatographic profiling.
- Absence of comparative analysis with other *Vishaghna* formulations may restrict the broader applicability.
- Results are preliminary and require correlation with in vivo and clinical outcomes**.**

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Author contribution

All authors contributed significantly to the study. Conceptualization and design along with the experimental work is carried out by corresponding author *Dr. Revenshidh Usturage*. Manuscript drafting and revision is also conducted by the author under the guidance of guide *Dr. Sunila Deo*. All authors have read and approved the final manuscript.

Conflict of interest: The authors declare no conflict of interest related to this work.

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