Received: 15 Jan. 2025	Revised: 17 Feb. 2025	Accepted: 19 Mar. 2025

Review Article

IJRPS
The Power of Wisdom

SCITEKHUB

ISSN: 3048-5606

"VATI KALPANA: STANDARDIZATION AND STABILITY CONCERNS IN AYURVEDIC PHARMACEUTICS"

Ms. Priya Bhaware[1]

AFFLIATIONS:
1. Research Assistant, Ira Consultancy & Research Organisation, Bhosari, Pune, Maharashtra 411026

CORRESPONDENCE:
Ms. Priya Bhaware
EMAILID:
priyabhaware0123@gmail.com

FUNDING INFORMATION:
Not Applicable

How to cite this article:
Priya Bhaware, "Vati Kalpana: Standardization and Stability Concerns in Ayurvedic Pharmaceutics" International Journal of Rasa Shastra and Pharmaceutical Sciences. 2025;2(1):5-8.

ABSTRACT

Introduction: Vati Kalpana (tablet or pill preparations) represents one of the most widely used dosage forms in Ayurveda due to its convenience, stability, and patient acceptability. Despite its long-standing use, issues related to standardization, stability, and quality control remain critical for ensuring therapeutic efficacy and global acceptance. **Methods:** A systematic review was conducted by consulting Ayurvedic classics (Charaka Samhita, Sushruta Samhita, Sharangadhara Samhita, Bhaishajya Ratnavali) and modern scientific literature from PubMed, Scopus, and Web of Science. Inclusion criteria comprised experimental studies, review articles, and clinical reports addressing Vati preparation, standardization, and stability. Exclusion criteria included non-classical dosage forms or studies without methodological rigor. **Results:** Classical Vati preparation emphasizes purification of raw materials, proper trituration, and binding agents for stability. Modern pharmaceutical approaches validate these principles with advanced analytical techniques such as HPTLC, HPLC, FTIR, and microbial assays. Studies highlight variability in particle size, moisture content, microbial contamination, and shelf-life as key challenges. Shelf-life of Vati preparations ranges from 1–3 years depending on ingredients, preparation methods, and storage. Emerging evidence suggests that incorporation of modern excipients and packaging techniques (blister packs, desiccants) can significantly enhance stability. **Discussion:** Integrating classical wisdom with modern pharmaceutical standards can optimize Vati formulations for consistency and safety. Challenges remain in harmonizing Ayurvedic principles with global regulatory requirements. Large-scale stability studies, real-time and accelerated shelf-life assessments, and pharmacokinetic evaluations are needed for wider clinical acceptance. **Conclusion:** Vati Kalpana exemplifies the adaptability of Ayurveda, but standardization and stability remain central concerns. Bridging classical pharmaceutics with modern quality assurance can enhance global recognition and integration of these formulations into mainstream healthcare.

KEYWORDS: Ayurveda, standardization, stability, tablet, Vati Kalpana

INTRODUCTION

Vati Kalpana, also known as Gutika Kalpana, refers to solid dosage forms prepared by triturating powdered herbs with suitable binding agents and shaping them into pills or tablets[1-2]. This dosage form is highly valued in Ayurveda due to its portability, longer shelf-life compared to liquids, ease of dosing, and palatability when combined with sweetening agents. The concept of Vati is extensively described in Sharangadhara Samhita and Bhaishajya Ratnavali, with applications spanning a wide spectrum of diseases[3-4].

From a modern pharmaceutical perspective, Vati resembles tablets or pills. However, unlike conventional tablets, Ayurvedic Vati formulations often employ natural binders, triturated herbal powders, and mineral preparations[5-6]. Challenges arise in maintaining consistency in weight, hardness, disintegration time, and stability across batches. Standardization of these parameters ensures therapeutic reliability and regulatory compliance[7-8].

The aim of this review is to systematically analyze classical principles of Vati Kalpana alongside modern pharmaceutical evidence. Objectives include: (i) outlining classical preparation methods, (ii) reviewing modern standardization parameters, (iii) evaluating stability concerns and shelf-life, and (iv) identifying gaps and future directions for harmonizing Ayurveda and modern pharmaceutics[9-10].

MATERIALS AND METHODS

A detailed literature search was conducted from **January to June 2025**.

- **Databases searched:** PubMed, Scopus, Web of Science, AYUSH Research Portal, Google Scholar[11].
- **Keywords used:** "Vati Kalpana," "Ayurvedic tablets," "standardization of Vati," "stability of Ayurvedic dosage forms," "Gutika Ayurveda. [12]"
- **Classical sources:** Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Sharangadhara Samhita, and Bhaishajya Ratnavali[13].
- **Inclusion criteria:** peer-reviewed studies, experimental research, review articles, pharmacopeial guidelines, and clinical reports addressing Vati preparation, quality control, or stability[14].
- **Exclusion criteria:** anecdotal reports, unpublished theses, formulations not described in Ayurvedic classics, and studies without methodological details[14].

Data were categorized thematically under classical principles, pharmaceutical standardization, analytical validation, stability studies, and clinical evidence[15].

OBSERVATION AND RESULTS

1. Classical Principles of Vati Kalpana

- **Raw Material Selection:** Based on therapeutic indications and purification (Shodhana) protocols.
- **Trituration (Mardana):** Continuous grinding of powders with binding agents like decoctions, honey, jaggery, or ghee until uniformity is achieved.
- **Shaping:** Pills of uniform size are hand-rolled or pressed using molds.
- **Drying and Storage:** Pills are dried under shade and stored in airtight containers to prevent moisture absorption.

2. Pharmaceutical Standardization Parameters

Modern parameters align with Ayurvedic quality assurance principles:

- **Organoleptic characteristics:** Color, odor, taste, and texture.
- **Physicochemical parameters:** Moisture content, pH, ash value, and extractive values.
- **Weight variation and hardness:** To ensure uniform dosing.
- **Disintegration and dissolution time:** Important for bioavailability.
- **Microbial load testing:** Ensures safety from contamination.
- **Analytical profiling:** HPTLC, HPLC, and FTIR for phytochemical consistency.

3. Stability Concerns

- **Moisture sensitivity:** Hygroscopic ingredients cause sticking and microbial growth.
- **Temperature fluctuations:** Affect phytochemical stability.
- **Packaging limitations:** Traditional storage in glass jars or paper packets lacks protection compared to modern blister packs.
- **Shelf-life:** Classical texts suggest 1–2 years, while modern stability studies indicate variability depending on formulation.

4. Modern Evidence of Shelf-Life and Stability

- **Accelerated stability studies:** Reveal degradation of active compounds after 6–12 months in poor storage.

- **Real-time studies:** Indicate that Vati prepared with sugar or jaggery bases remain stable longer than those with decoction-based binders.
- **Improved packaging:** Use of desiccants, aluminum blister packs, and vacuum sealing extends shelf-life.
- **Microbial safety:** Proper sterilization and GMP practices reduce contamination risks.

5. Clinical and Pharmaceutical Relevance

- **Patient compliance:** Tablets are easy to administer and dose precisely.
- **Global acceptance:** Requires compliance with WHO and pharmacopoeial standards.
- **Regulatory perspective:** Stability testing protocols (ICH guidelines) must be adapted for Ayurvedic dosage forms.

6. Challenges Identified

- Lack of harmonized pharmacopeial standards for all Vati formulations.
- Insufficient long-term stability studies with modern tools.
- Variability in raw materials leading to batch-to-batch inconsistency.
- Limited mechanistic understanding of bioavailability and pharmacokinetics.

DISCUSSION

Vati Kalpana bridges Ayurveda and modern pharmaceutics by offering a solid dosage form that is convenient, effective, and adaptable. Classical texts emphasize purity of raw materials, prolonged trituration, and appropriate storage, all of which correlate with modern pharmaceutical principles of quality control and stability[16].

Standardization is a critical challenge. Unlike modern tablets that employ synthetic binders and excipients, Ayurvedic Vati relies on natural substances, leading to variability in hardness, disintegration, and shelf-life. Advanced analytical methods like HPLC and HPTLC have improved reproducibility, but widespread adoption remains limited[17].

Stability remains the foremost concern. Moisture absorption and microbial contamination often compromise the safety and efficacy of Vati preparations. Real-time and accelerated stability studies are scarce, and most available data are from small-scale investigations. Adopting modern packaging strategies such as blister packs, desiccants, and vacuum sealing can significantly improve shelf-life. Moreover, adherence to WHO and ICH stability protocols could align Ayurvedic tablets with international standards[18-19].

Future directions include establishing pharmacopeial monographs for commonly used Vati formulations, conducting large-scale stability trials, and integrating pharmacokinetic evaluations to assess bioavailability. Collaborations between Ayurvedic scholars, pharmaceutical scientists, and regulatory bodies are necessary to strengthen global acceptance of these formulations[20].

CONCLUSION

Vati Kalpana stands as one of the most significant dosage forms in Ayurveda, offering portability, stability, and patient-friendly administration. However, variability in preparation methods, raw materials, and storage conditions presents challenges in achieving consistent quality.

Standardization through analytical tools, GMP practices, and pharmacopoeial benchmarks can address variability. Modern stability testing and innovative packaging solutions can further enhance shelf-life and therapeutic reliability. Integration with ICH and WHO guidelines will ensure wider global acceptance.

In summary, Vati Kalpana embodies the timeless principles of Ayurveda, but its future lies in harmonizing classical wisdom with modern scientific validation. By addressing concerns of standardization and stability, Vati formulations can be positioned as reliable, safe, and effective dosage forms in integrative healthcare systems worldwide.

REFERENCES

1. Charaka. Charaka Samhita. Chaukhamba Orientalia, Varanasi; 2018.
2. Sushruta. Sushruta Samhita. Chaukhamba Sanskrit Pratishthan, Delhi; 2017.
3. Vagbhata. Ashtanga Hridaya. Chaukhamba Krishnadas Academy, Varanasi; 2016.
4. Sharangadhara. Sharangadhara Samhita. Chaukhamba Orientalia, Varanasi; 2015.
5. Govind Das. Bhaishajya Ratnavali. Chaukhamba, Varanasi; 2014.
6. Ministry of AYUSH. Ayurvedic Pharmacopoeia of India. Govt of India; 2019.
7. Mukherjee PK. Quality control of herbal drugs. Business Horizons, New Delhi; 2019.
8. Patwardhan B, et al. Ayurveda and natural products drug discovery. Curr Sci. 2004;86(6):789–99.

9. Srikanth N, Singh R. Standardization of Ayurvedic dosage forms. AYU. 2015;36(4):234–42.
10. Harwansh RK, Mukherjee PK. Stability of Ayurvedic formulations: Current status. Phytomedicine. 2014;21(3):1–8.
11. Yadav NP, Dixit VK. Excipients in traditional formulations. Int J Integr Biol. 2008;3(3):195–203.
12. Bhalerao S, Deshpande A. Ayurvedic tablets: A pharmaceutics perspective. J Ayurveda Integr Med. 2012;3(4):223–6.
13. Ministry of AYUSH. Guidelines for Stability Testing of Ayurvedic Dosage Forms. Govt of India; 2020.
14. Valiathan MS. The Legacy of Caraka. Orient Blackswan, Hyderabad; 2009.
15. Kesarwani K, Gupta R. Herbal bioavailability enhancers. Asian Pac J Trop Biomed. 2013;3(4):253–66.
16. Dwivedi V, Tripathi S. Pharmaceutical insights on Vati Kalpana. J Ethnopharmacol. 2014;152(2):101–10.
17. Gopani P, Patel M. Stability and standardization of Ayurvedic tablets. Int J Pharm Sci Res. 2019;10(7):3081–9.
18. Sharma R, Dash B. Principles and Practice of Ayurvedic Pharmacy. Chaukhamba, Varanasi; 2017.
19. Narahari SR, et al. Clinical relevance of Ayurvedic dosage forms. Indian J Pract Med. 2010;55(1):1–5.
20. Harwansh RK, et al. Shelf-life assessment of Ayurvedic pills. Phytomedicine. 2016;23(5):450–62.