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ROLE OF AGNI (TEMPERATURE) IN AYURVEDIC PHARMACEUTICS – FROM TRADITION TO MODERN STANDARDS

[1]Dr Devraj J Saroj, [2]Dr Maitry Sachinwala
[1]Assistant Professor, Vijyashree Ayurvedic Medical College and Hospital, Jabalpur, Madhya Pradesh, India.
[2]Assistant Professor, Parul Institute of Ayurved, Vadodara, Gujarat, India.

ABSTRACT

Introduction: *Ayurveda* recognizes *Agni* (fire/heat) as a transformative principle central to both human physiology and pharmaceutical processes. In pharmaceutics, temperature regulation ensures purification, transformation, stability, and therapeutic efficacy of formulations ranging from herbal decoctions to *Rasaushadhi* (Herbo-mineral preparations). **Materials and Methods:** This review based on classical texts (*Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya*) and modern scientific literature sourced through targeted keywords such as *Agni*, *Bhasma*, and *Ayurvedic* pharmaceutics. Data were synthesized to correlate traditional heating methods (*Shodhana, Paka, Puta*) with contemporary analytical findings (XRD, SEM, HPTLC) and GMP guidelines. **Results and Discussion:** Temperature is shown to be the pivotal factor in drug transformation, determining safety, efficacy, and reproducibility. Classical classifications of *Agni* (e.g., *Mridu, Madhyama, Tivra Agni*) and specialized systems such as *Puta* provide frameworks for heat application, ensuring detoxification, nanoparticle formation, and shelf-life stability. In *Sneha Kalpana* and *Avaleha Kalpana*, precise *Paka Lakshanas* mark therapeutic readiness, while in *Rasashastra* preparations, controlled heating achieves *Sukshmatva, Laghutva,* and *Yogavahitva*. Modern technologies such as programmable furnaces, thermocouples, and advanced analytical tools quantify and validate these processes, bridging empirical tradition with scientific reproducibility. **Conclusion:** *Agni* functions as both a philosophical and technological cornerstone in *Ayurvedic* pharmaceutics. Its controlled application ensures purification, transformation, and enhanced bioavailability. Integration with modern tools strengthens standardization and global acceptability, making temperature the decisive mediator between traditional wisdom and scientific validation.

Keywords: *Ayurveda, Agni, Paka, Puta, Rasaushadhi, Ayurvedic* pharmaceutics, temperature regulation.

INTRODUCTION

Ayurveda, the ancient system of medicine originating in India, emphasizes a holistic approach to health, integrating physical, mental, and spiritual well-being.[1] Central to *Ayurvedic* pharmaceutics is the concept of *Agni,* the principle of transformation and metabolism, which extends from digestion in the human body to the preparation and processing of medicinal formulations. In *Ayurvedic* pharmaceutics, *Agni* is not merely a metaphorical concept but a practical regulator of temperature, determining the efficacy, safety, and stability of herbal, mineral, and herbo-mineral/metallic preparations.

Temperature plays a critical role in the transformation of raw materials into therapeutic forms. Classical methods such as *Shodhana* (purification) [2], *marana* (incineration) [3], *puta* (calcination) [4], and *paka* (cooking) [5] rely on precise control of heat to modify chemical and physical properties, enhance bioavailability, and eliminate toxicity. For example, the preparation of *Bhasma* (calcinated mineral/metallic

powders) [6] requires repeated heating cycles at defined temperatures to convert metals into bioavailable and safe forms. Similarly, the preparation of medicated oils (*Sneha Kalpana*) [7], decoctions (*Kwatha*) [8], and confections (*Avaleha*) [9] depends on careful thermal regulation to optimize extraction, stability, and therapeutic potential of active constituents.

Modern research has begun to correlate classical temperature-based practices with scientific principles. Thermochemical studies, X-ray diffraction (XRD), scanning electron microscopy (SEM), and other analytical techniques have confirmed that controlled heating induces structural changes, nanoparticle formation, and chemical transformations essential for efficacy. Furthermore, research has demonstrated that deviations from optimal temperature ranges can lead to degradation of bioactive constituents, incomplete purification, or formation of toxic by-products, highlighting the critical nature of thermal control in *Ayurvedic* pharmaceutics.

Despite these insights, challenges remain in standardizing temperature-dependent processes. Traditional heating methods, such as cow-dung cake furnaces (*puta*), are variable, relying heavily on empirical experience and organoleptic endpoints such as colour, smell, and texture. This subjectivity makes reproducibility difficult, particularly in the context of modern pharmaceutical manufacturing and regulatory compliance. To bridge this gap, contemporary studies have explored programmable furnaces, thermocouple monitoring, and digital thermal profiling to replicate classical *Agni* processes with reproducibility and safety, aligning *Ayurvedic* pharmaceutics with Good Manufacturing Practices (GMP).

The purpose of this review is to analyse the importance of temperature in *Ayurvedic* pharmaceutics, emphasizing its role in chemical transformation, safety, standardization, and therapeutic efficacy. It synthesizes classical knowledge, modern research findings, and emerging technological adaptations, thereby providing a comprehensive understanding of how temperature functions as a critical determinant in *Ayurvedic* drug preparation. By integrating traditional wisdom with modern science, the review highlights pathways for optimizing efficacy, ensuring safety, and achieving global acceptability of *Ayurvedic* medicines.

MATERIALS AND METHODS

This review collates evidence from classical *Ayurvedic* texts including the *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hṛidaya, Sharangdhara Samhita,* etc. and modern scientific literature retrieved from Journals. The analysis focused on extracting documented temperature parameters, thermal transformation effects, and standardization data (e.g. XRD, SEM, HPTLC) to correlate classical heating concepts (*Shodhana*, *paka*, *puta*) with contemporary thermal science and GMP.

RESULTS AND DISCUSSION

The Conceptual Framework of *Agni* and *Paka* in Pharmaceutics: In *Ayurvedic* pharmaceutics (*Aushadha Nirmana*), the principle of *Agni* (fire/transformation) is fundamental, extending its metaphysical significance into a practical role as the thermal energy essential for drug preparation. The classical methods of *Agni Tapa* (direct heat) and *Bhanu Tapa* (solar heat) form the foundation of pharmaceutical operations. The entire process is governed by the attainment of *Paka*, a state of complete transformation or perfect processing. *Paka* includes a spectrum of heating methods, including *Bharjana* (frying), *Swedana* (steaming), and *Putapaka* (incineration). This principle is central to *Samskara* (processing), wherein the interaction of a substance (*Dravya*) with heat enables *Gunantaradhanam* (Enhancement of existing therapeutic properties and acquisition of new ones).[10] This transformative role of heat is briefly highlighted in *Acharya Charaka "Toya Agni Sannikarsha"* the critical interaction with water and fire.[11]

Classical Systems for Classifying and Sourcing Heat: Ancient *Ayurvedic* texts present sophisticated, multi-tiered systems for classifying heat intensity, moving well beyond simple qualitative descriptions. One such framework is the six-tier system (*Shadvidha*), applied particularly in preparations like *Arka Kalpana*. In this system, heat is categorized into six distinct types - *Dhumagni, Dipagni, Mandagni, Madhyamagni, Kharagni, Bhatagni*.[12] Six types of *Agni* are described in sequence. *Dhumagni* is characterized by smoke without flames, while *Dipagni* arises when the intensity increases two to four times of *Dhumagni*. A still stronger flame forms *Mandagni* with an intensity four times greater than that of Dipagni, and when doubled it becomes

Madhyamagni, a balanced heat. *Kharagni* high-intensity flame used for all pharmaceutical processes. The most intense is *Bhatagni*, where flames rise to the vessel's top and spread in all directions. Each stage of heat was carefully defined with prescribed quantities of fuel to ensure precision.

The principle of *Agni* is closely integrated with the *Puta* system, which serves as the unit of heat essential for the proper *Paka* (processing) of *Rasadi Dravya*. A widely practiced three-tier (*Trividha*) classification distinguishes *Mridu Agni* (mild), *Madhyama Agni* (moderate), and *Tivra Agni* (intense), each produced through specific *Putas*.[13] For example, *Lavaka* and *Kapota Puta* generate *Mridu Agni*; *Kukkuta* and *Varaha Puta* produce *Madhyama Agni*, while *Gaja* and *Maha Puta* produces *Tivra Agni*, with *Gajaputa* demanding one thousand *Upalas*. Traditionally, *Upalas*, particularly *Vanyopala* derived from forest-grazing cows, were preferred for their ability to produce high and sustained heat and their property of *Svanga Shitata* (gradual self-cooling), providing a controlled thermal environment ideal for delicate processes such as *Bhasma Nirmana*. The concept of *Puta* is further categorized by heat source into *Surya Puta*, *Chandra Puta*, and *Agni Puta*, the latter being the most widely used in *Rasaushadhi* [14] preparation. To ensure reproducibility, *Acharyas* standardized these methods by defining the number of *Upalas* and constructing pits of precise dimensions for controlled heating, forming the basis of the *Trividha Agni* system. While these empirical methods were highly effective, they depended on variable natural fuel sources; modern *Ayurvedic* pharmaceutics now supplements them with controllable sources like LPG and electricity to ensure consistency and standardization.

Table 1: Types of Agni and Their Characteristics

Type of Agni	Features
Dhumagni	Smoky, no visible flame, produces a large amount of fumes
Deepagni	Flame is 2–4 times that of Dhumagni
Mandagni	Flame is 4 times that of Deepagni
Madhyamaagni	Flame intensity is 2 times that of Mandagni
Kharaagni	High-intensity flame, used for all purposes
Bhataagni	High burning flame, spreads evenly across the vessel

Application in Herbal Formulations: The role of *Agni* in herbal formulations is meticulously defined, with the attainment of *Paka* serving as the decisive marker for concluding the heating process. Each preparation type has its own criteria for determining the correct stage of transformation. In the case of *Swarasa* (fresh juice extraction) [15], fibrous drugs are subjected to *Putapaka*, a method where a bolus of the drug is heated indirectly until the outer coating attains the colour of red-hot coal, described as *Lepasya Angara Varnata*.[16] This ensures complete extraction of the active principles. For *Kwatha* (decoction) [17], the drug is boiled over sustained *Mandagni* (gentle heat) until the liquid is reduced to one-eighth of its original volume. Various derivatives, or *Upakalpanas*, such as *Pramathya* [18], *Laksharasa* [19], *Yavagu* [20] and *Yusha* [21], follow specific reduction ratios, each designed to target particular *doshas* (*Vata*, *Pitta*, or *Kapha*).

In *Sneha Kalpana* [22], the stage of *Paka* is critical for therapeutic efficacy. *Ama Paka* (undercooked) has soft *Kalka* with high water content and crackles on heating, while the *Sneha* is heterogeneous. *Mridu Paka* (slightly moist) shows sticky *Kalka* with traces of water; *Sneha* emits faint crackling and is ideal for *Nasya*. *Madhyama Paka* is water-free, non-sticky, rollable into a *Varti*; *Sneha* is frothy or shows froth subsidence, with good colour, odour, and taste. *Khara Paka* has hard, blackened *Kalka* and dry *Sneha*, suitable for *Abhyanga*. *Dagdha Paka* is burnt, rough, and charred, with loss of colour, odour, and therapeutic properties. Proper control of *Paka* ensures the desired consistency, efficacy, and stability of the formulation.[23]

In *Avaleha Kalpana* [24] preparations, heating is continued until the *Tantu* (thread-forming) stage, ensuring proper preservation, taste, and therapeutic efficacy. Quality is assessed using classical markers: *Tantumatva* (thread-like appearance), *Peeditomudra* (finger prints on pressing), *Apsumajjana* (sinks in water), *Gandhavarnarasodbhava* (correct odour, colour, taste), *Sthiratva* and *Kshiptastunishchala* (firmness), *Sukhamarda* (softness for rolling), *Sukhasparsha* (smooth touch), and *Darvipralepa* (adhesion to stirring tool).

These markers, described in *Sharangdhara Samhita*, *Bhava Prakasha*, and *Bhaishajya Ratnavali*, ensure proper *Paka*, consistency, and overall quality.[25]

Table 2: *Agni* Requirements for Various *Aushadha Kalpanas*

Kalpana	**Heat Requirement**	***Agni* Type**	**Remarks**
Swarasa Kalpana	Direct/Indirect heating	*Mridu, Madhyama, Tīvraagni*	*Kalka* is covered and heated indirectly
Churna Kalpana	Roasting (*Bharjana*)	*Mandagni*	Drugs like *Hingu, Kupeelu* require roasting before powdering
Kwatha Kalpana	Continuous heat till reduction	*Mandaagni*	Heat maintained until 16 parts of water with 1 part of *Dravya* reduces to 1/8th
Phanta Kalpana	Heating of water	*Mandaagni*	Pounded *Dravya* added to heated water
Mantha Kalpana	Churning with cold water	Indirect heat	Friction during churning generates required heat
Avaleha Kalpana	Heating till consistency	*Mandaagni*	Mixture becomes semisolid, suitable for licking
Vati / Guti / Guggulu Kalpana	Reheating of *Kwatha*	*Mandaagni*	*Guggulu* or *Guda* added to *Kwatha*, heated till desired consistency
Guda Paaka	Heating till consistency	*Mandaagni*	1 part of water and 4 parts of *Guda* heated to *Avalehya* consistency
Khanda Kalpana	Frying with *Ghrita*	*Mandaagni*	*Kalka* or *Churna* fried with *Ghrita* till 4-5 thread consistency
Sneha Kalpana	Varies on different stages of paka	*Mandaagni*	Heat energy administered to achieve desired consistency

The Pinnacle of Thermal Processing in *Rasashastra*: The preparation of *Rasaushadhi* (herbo-mineral formulations) epitomizes the most precise and transformative use of *Agni* in Ayurveda. The process begins with *Shodhana* (purification) [26], where heat is applied through *Svedana* (sudation) and *Paka* (processing) removing impurities (*Mala*) and toxic principles (*Visha*). Thermal treatment initiates oxidation–reduction reactions that convert raw metals into safer, bioavailable forms, such as the transformation of iron into non-toxic iron oxide nanoparticles in *Lauha Bhasma*. Similarly, heating detoxifies toxic alkaloids in herbs like *Vatsanabha*.[27] Modern tools like XRD and SEM confirm that *Shodhana* reduces microbial load and converts toxic metals into inert forms.

Following purification, *Marana* (calcination) [28] is undertaken through carefully regulated *Puta* systems. *Bhavana* (levigation) [29] softens the drug and makes it more receptive to heat, while *Marana* applies controlled high temperatures to induce complete transformation into *Bhasma*. Temperature here governs detoxification, oxidation, particle size reduction, and the acquisition of therapeutic qualities such as *sukshmatva* (subtlety) and *laghutva* (lightness). For instance, three *Kukkutaputas* suffice for *Tuttha*, whereas *Abhraka* may demand up to one thousand *Gajaputas*. The success of *Marana* is judged by classical *Bhasma Pariksha*.[30] *Rekhapurnatva* (fineness filling finger furrows) reflects adequate particle reduction, while *Varitaratva* (floatability on water) indicates lightness from proper thermal breakdown. *Nishcandratva* (loss of metallic shine) and *Apunarbhava* (irreversibility) confirm complete chemical conversion, achievable only at correct heating cycles and peak temperatures. Without proper temperature, *Bhasma* may remain coarse, retain toxicity, or fail to acquire stability.

Specialized preparations like *Parpati* and *Kupipakva Rasayana* further highlight thermal precision. In *Parpati Kalpana*, the stage of *Paka* is assessed by texture and the iridescent shine of *Mayuracandrika Varna*. In *Kupipakva* preparations, heat is applied in a graded manner, rising from *Mridu Agni* (150–250 °C) to *Tīvra Agni* (500–650 °C), to enable sublimation and compound formation. Thus, temperature is not just a technical parameter but the very determinant of safety, efficacy, and pharmacological potency in *Rasaushadhi* preparation. It ensures that physical, chemical, and energetic transformations are complete, producing formulations that pass both classical tests and modern scientific validation.

Mechanisms of Transformation, Stability, and Enhanced Bioavailability: In *Rasashastra*, the judicious application of *Agni* governs every stage of *Rasaushadhi* preparation, ensuring that crude, unstable or toxic substances are transformed into safe, stable, and therapeutically potent medicines. Heat acts at multiple mechanistic levels: it decomposes undesirable impurities, drives oxidation–reduction reactions that convert raw metals and minerals into bio assimilable forms, and facilitates the extraction and solubilization of active phytoconstituents. Thermal processing also reorganizes materials into optimized nano- and micro-architectures, directly enhancing their pharmacological performance.

Stability is another crucial dimension shaped by *Agni*. Correct heating removes residual moisture, inactivates degradative enzymes, and stabilizes active principles, thereby preventing spoilage and degradation. In *Sneha Kalpana* (preparation of medicated oils and ghee), maintaining temperatures around 90–110 °C evaporates water and prevents rancidity, while in *Bhasma Nirmana*, high-temperature calcination converts metals into inert, nanocrystalline oxides resistant to environmental decay. Modern analytical studies validate these observations, showing that optimized thermal treatment lowers peroxide values in oils, reduces microbial load, and significantly extends shelf-life.

Agni not only drives chemical reactions but also strengthens and stabilizes the bonding among particles, ensuring structural integrity during processing. Beyond this transformative role, *Agni* functions as a fundamental bioenhancer (*Yogavahi*) through calcination, metals are reduced to nano-sized particles with vastly increased surface area, enhancing absorption and systemic availability. In herbal preparations, moderate heating between 70–100 °C optimizes the release of thermolabile constituents such as alkaloids and flavonoids, thereby improving therapeutic bioavailability. Contemporary pharmacokinetic studies confirm these principles, showing that heat-processed formulations yield higher plasma concentrations of active compounds compared to their raw forms. Thus, the pinnacle of thermal processing in *Rasashastra* lies not only in detoxification and preservation but also in imparting the subtle qualities like *Sukshmatva*, *Laghutva*, and *Yogavahitva*, that make *Rasaushadhis* uniquely potent and therapeutically reliable.

Standardization and Modern Integration: Although the classical system of *Agni* application in *Rasashastra* is profound, its dependence on subjective *Lakshanas* (organoleptic markers) and naturally variable fuel sources often limits reproducibility. In the present era, Good Manufacturing Practices (GMP) demand standardized, validated and reproducible methods. This has prompted a necessary convergence between traditional empirical wisdom and modern scientific technology. A significant advancement in this integration is the quantification of traditional heat categories: *Mridu Agni*, *Madhyama Agni* and *Tivra Agni* with 300–900 °C. Such mapping allows ancient protocols to be reliably reproduced under laboratory and industrial conditions.

Technological innovations further support this transition. Programmable electric furnaces and controlled heating systems now simulate classical *Puta* cycles with precise temperature–time profiles, ensuring uniformity in *Bhasma* preparation. These instruments preserve the spirit of traditional methodology while eliminating variability. At the same time, advanced analytical tools such as X-ray diffraction (XRD), scanning electron microscopy (SEM), high-performance liquid chromatography (HPLC), and gas chromatography–mass spectrometry (GC-MS) validating classical *Paka Lakshanas*. Changes once judged by colour, texture, or behaviour are now validated by measurable parameters like nanoparticle size, crystalline structure, phytochemical profile, and reduced toxicity. This synergy of tradition and science ensures batch-to-batch

consistency, enhances safety, and paves the way for the global acceptance of *Ayurvedic* formulations without compromising their therapeutic essence. Looking ahead, emerging tools such as AI-driven (Artificial Intelligence–driven) predictive modelling and IoT-enabled (Internet of Things–enabled) smart furnaces hold promise for further refining, automating, and scaling these ancient principles with unprecedented precision, realizing a seamless fusion of empirical heritage and scientific rigor.

CONCLUSION

Agni in *Ayurvedic* pharmaceutics is both a transformative principle and a precise technological tool. From *Shodhana* and *Bhasma Nirmana* to specialized preparations like *Parpaṭi* and *Kupipakva Rasayana*, controlled application of heat ensures purification, stability, and enhanced bioavailability. Classical *Paka Lakshanas*, once judged organoleptically, are now validated through modern techniques such as XRD, SEM, and HPLC, confirming their scientific reliability. The integration of programmable furnaces, quantified heat ranges, and advanced analytics bridges ancient wisdom with modern standardization, ensuring reproducibility and safety. Emerging technologies like AI-driven modeling and smart furnaces promise even greater precision. Thus, *Agni* stands as a timeless mediator between tradition and science, ensuring that transformation remains the foundation of therapeutic efficacy.

REFERENCES

1. Sushruta Samhita, Sutrasthana, 8th ed. Varanasi: Chaukhamba Orientalia; 2005, Dosha-Dhatu-Mala Kshaya Vriddhi Vijnaniya Adhyaya 15, Verse 41, Page No. 75.
2. Acharya Sadanada Sharma, Rasa Tarangini, Translated by Shri Kashinath Shastri, 11th Edition, Reprint 2004, Motilala Banarsidas, New Delhi, Chapter 2, Verse 52, Page No. 22
3. Dr. C. B. Zha, Ayurvediya Rasashastra, 2nd Edn, Chaukhambha Surbharati Prakashana, 2002, Page No. 73.
4. Shastry Ambikadatta, Rasaratna Samucchaya of Sri vaghbhata, Varanasi, Chowkambha Amarabharati prakashana, 8th edition; Chapter 10, Verse 47, Page No. 164.
5. Bahudureya Radhakanthadeva, Shabdakalpadhruma, Dwiteeya khanda, Delhi, Nagpublishers, 1987; Page No. 88-89.
6. Sharma H.S, Hindi commentary on Rasendra Mangala of Nagarjuna, Chaukhambha Orientalia, Varanasi; 2003, Edition Ist, Chapter 2, Verse 46, Page No. 45.
7. Shrivastava.S, Sharangdhar Samhita, Chaukhamba Orientalia, Madhyam khanda, Chapter-9, 1996, Page No. 215-243.
8. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, Chapter 2, Verse 1, Reprint 2021; Page No. 144.
9. Pt. Parashuram Shastri Vidyasagar (eds), Sharangadhara Samhitha, 1st ed. Varanasi: Chowkhamba Krishnadas Academy, Madhyama Khanda 8/1. 2013; Page No. 206.
10. Charaka Samhitha of Agnivesha, Vaidya Manorama Hindi commentary, Vol1, Vimana Sthana, Varanasi, Chowkambha, Surabharathi Prakashana, chapter 1, shloka 21, Reprint 2015; Page No. 554.
11. Charaka Samhitha of Agnivesha, Vaidya Manorama Hindi commentary, Vol1, Vimana Sthana, Varanasi, Chowkambha, Surabharathi Prakashana, chapter 1, shloka 21, Reprint 2015; Page No. 554.
12. Pandith Mukunda Rama, Arkapraksha of Ravana, Mumbai, Shri Venkateshwara Press, Chapter 1, Verse 80-86, Reprint 2019; Page No. 18-19.
13. Sadanand Sharma, Rasa tarangini, 3rd edn., Motilal Banarasidas Publication, Delhi, Chapter 2, Verse 52, 1986, Page No. 22.
14. Rasa Vagbhata, Rasa RatnaSamucchaya, Indian Medical Practitioners Cooperative Pharmacy Ltd, Adyar, Chennai, 1st Ed, 28 (Uttara Khanda 17)/1-2, 1963; Page No. 453.
15. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 1, Verse 2, Reprint 2021; Page No. 138.

16. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 1, Verse 21, Reprint 2021; Page No. 141.
17. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 2, Verse 1, Reprint 2021; Page No. 144.
18. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 2, Verse 150-151, Reprint 2021; Page No. 164.
19. Dravyaguna Vigyana of Vaidya Yadavji Trikamji Acharya, Kolkata, Janawani Press and Publication Limited, Reprint 2010.
20. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 2, Verse 152-153, Reprint 2021; Page No. 164.
21. Sharangdhar Samhita, Dipika Hindi commentary by Brahmanand Tripathi, Choukhambha Sanskrit Bhawan, Varanasi, 2011, Madhyama khanda, Chapter 2, Verse 154.
22. Shastri.K and Chaturvedi.G, 2013, Charaka Samhita, Chaukhambha Bharti Academy, Volume 1, Sutrasthan, Chapter-13, Page No. 255-280.
23. Shrivastava.S, Sharangdhar Samhita, Chaukhamba Orientalia, Madhyam khanda, Chapter-9, 1996, Page No. 215-243.
24. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 8, Verse 1, Reprint 2021; Page No. 206.
25. Sharangadhara Samhitha of Aadhamalla virachitha 'Deepika Vyakhya'& Pandit Kashiram Vaidya, MadhyamaKhanda, Varanasi, Chowkambha Surabharathi Prakashana, chapter 8, Verse 3, Reprint 2021; Page No. 207.
26. Acharya Sadanada Sharma, Rasa Tarangini, Translated by Shri Kashinath Shastri, 11th Edition, Reprint 2004, Motilala Banarsidas, New Delhi, Chapter 2, Verse 52, Page No. 22.
27. Angadi R. Rasa Tarangini of Sri Sadanandasarma, 1st Ed. Varanasi: Chaukhamba Surbharati Prakashan. Chapter 24, Verse 19-25. 2015. Page No. 436.
28. Dr. C. B. Zha, Ayurvediya Rasashastra, 2nd Edn, Chaukhambha Surbharati Prakashana, 2002, Page No. 73.
29. Acharya YT. Charaka Samhita, Kalpasthana, Reprint edition, Varanasi: Chaukhambha Orientalia; 2004, Chapter 12, Verse 48.
30. Dr. Ashok D Satpute, Rasaratnasamucchaya Sanskrit text with English translation, Delhi, Chaukhambha Sanskrit Pratishthan, 2003; Chapter 10, Verse 48- 50, Page No. 234.