



ISSN (E): 2277- 7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.03  
TPI 2019; 8(10): 64-69  
© 2019 TPI  
www.thepharmajournal.com  
Received: 11-08-2019  
Accepted: 15-09-2019

**Dr. Visal S Kumar**  
PG Scholar, Department of PG  
Studies In Kaumarabhritya, Sri  
Dharmasthala  
Manjunatheshwara College of  
Ayurveda and Hospital,  
Kuthpady, Udupi, Karnataka,  
India

**Dr. Prathviraj Puranik**  
Professor and Head, Department  
of PG Studies In  
Kaumarabhritya, Sri  
Dharmasthala  
Manjunatheshwara College of  
Ayurveda and Hospital,  
Kuthpady, Udupi, Karnataka,  
India

**Dr. Nagaratna S Jartarghar**  
Assistant Professor, Department  
of PG Studies In  
Kaumarabhritya, Sri  
Dharmasthala  
Manjunatheshwara College of  
Ayurveda and Hospital,  
Kuthpady, Udupi, Karnataka,  
India

**Corresponding Author:**  
**Dr. Visal S Kumar**  
PG Scholar, Department of PG  
Studies In Kaumarabhritya, Sri  
Dharmasthala  
Manjunatheshwara College of  
Ayurveda and Hospital,  
Kuthpady, Udupi, Karnataka,  
India

## Preparation of darvyadi loha churna: An ayurvedic formulation for iron deficiency anemia

**Dr. Visal S Kumar, Dr. Prathviraj Puranik and Dr. Nagaratna S Jartarghar**

### Abstract

Iron deficiency anemia (IDA) is considered to be one of the most prevalent form of malnutrition which affects over 30% of world population. *Choorna Kalpana* is one among the most predominantly used Ayurvedic pharmaceutical preparation. It is a fine powder of herbs or group of herbs and some times added with processed mineral or metal, salt or sugar.

*Darvyadi Loha* is a herbo-mineral preparation mentioned in Ayurvedic classics for the management of *Pandu Roga*. On analyzing the clinical features for *Pandu*, it can be correlated with Iron deficiency anemia mentioned in the contemporary sciences. The formulation *Darvyadi Loha* contains *Darvi* (*Berberis aristata* DC.), *Haritaki* (*Terminalia chebula* Retz.), *Vibhitaki* (*Terminalia bellerica* Roxb.), *Amalaki* (*Emblia officinalis* Gaertn), *Pippali* (*Piper longum* Linn.), *Maricha* (*Piper nigrum* Linn.), *Shunti* (*Zingiber officinalis*), *Vidanga* (*Embelia ribes* Burm.) and *Loha Bhasma* (incinerated iron). This formulation was prepared according to the principles of preparation of *Choorna Kalpana* mentioned in the Ayurvedic classics and by using modern pharmaceutical equipments. In this article, details of the individual drugs of *Darvyadi Loha Choorna* and the method of preparation of the formulation have been detailed.

**Keywords:** *Choorna, darvyadi loha, pharmaceutical, iron deficiency anemia, pandu roga*

### Introduction

*Pandu Roga* is one among the Rasa Pradoshaja Vikara<sup>[1]</sup> mentioned in the Ayurvedic classics and is associated with *Raktalpata* and *Panduta* of the body, where the lusture of the body is expalined as *Ketaki Dhuli Sannibha*<sup>[2]</sup>. On analyzing the clinical features of *Pandu Roga* it can be corelated with the Iron deficiency anemia (IDA) mentioned in the contemporaray sciences. IDA is a very common disease prevalent in the society and side effects of oral allopathic iron preparations are frequently encountered<sup>[3]</sup>.

*Darvyadi Loha*<sup>4</sup> is a herbo mineral compound preparation mentioned in Ayurvedic treatises for the management of *Pandu Roga*. The aim behind the administration of any formulation is to reach out the target tissue or organ for reversing the disease pathology. For this, various pharmaceutical preparations termed as “*Kalpanas*” and “*Upakalpanas*” were mentioned in Ayurveda. *Choorna Kalpana* is one such widely used preparation which is an *Upakalpana* of *Kalka Kalpana*<sup>[5]</sup>.

*Choorna* is a fine powder of herbs or group of herbs and some times added with processed mineral or metal, salt or sugar<sup>[6]</sup>. They are the mixture of dry substances reduced to fine form and intimately mixed together. The method of mixing, greatly effect the miscibility of the powders. And in *Choorna Kalpana*, since the particle size is small, it produces rapid dissolution in the body fluids than other solid dosage forms and thereby concentration of drug in the circulation is more in lesser time. Also it can be easily administered with the *Anupana* mentioned for the formulation, especially to the patients who cannot swallow solid dosage forms<sup>[7]</sup>.

The formulation *Darvyadi Loha* contains one part each of 8 herbal drugs and *Loha Bhasma* and is an active amalgamation for the treatment of *Pandu Roga* or IDA. This article highlights the different ingredients and the method of preparation of *Darvyadi Loha Choorna*.

### Materials and Methods

Ingredients of the formulation are:

1. *Darvi* (*Berberis aristata* DC.)
2. *Haritaki* (*Terminalia chebula* Retz.)

3. *Vibhitaki (Terminalia bellerica Roxb.)*
4. *Amalaki (Embllica officinalis Gaertn.)*
5. *Pippali (Piper longum Linn.)*
6. *Maricha (Piper nigrum Linn.)*
7. *Shunti (Zingiber officinalis)*
8. *Vidanga (Embelia ribes Burm.)*
9. *Loha Bhasma (Incinerated iron)*

### **Darvi (Berberis aristata DC.)<sup>[8]</sup>**

It is an erect glabrous spinescent shrub and belongs to the family Berberidaceae. It contains Berberine, oxyberberine, berbamine, arimaline, karachine, palmatinr, oxycanthine and taxilamine. Pharmacological activities of the plant includes antipyretic, hypoglycaemic, gastro irritant, local anaesthetic, anti cancerous, anti coagulant, anti bacterial, anti protozoal, anti inflammatory anti trachoma, CNS depressant and fresh berries are laxative in action.

**Useful part:** root, stem, fruit, extract (*Rasanjana*)

#### **Ayurvedic properties**

*Rasa:* Tikta, Kashaya (*Rasanjana – Katu*)  
*Guna:* Ruksha, Laghu  
*Veerya:* Ushna  
*Vipaka:* Katu  
*Doshaghnata:* Kapha Pitta Shamaka  
*Rogaghnata:* Shotha, Netrabhishyanda, Karna Shoola, Mukha Roga, Vrana, Phiranga, Upadamsha, Bhagandara, Visarpa, Agnimandya, Kamala, Yakrut Vikara, Aruchi, Trishna, Kasa, Jwara and Twak Dosh.

### **2. Haritaki (Terminalia chebula Retz.)<sup>[9]</sup>**

It is one of the ingredients in Triphala and belongs to family Combretaceae, well known by name Chebulik myrobalan. Preliminary studies for photochemical screening suggest the presence of Antharquinone glycoside, chebulinic acid, chebulagic acid, tannic acid, terchebin, tetrachebulin, Vitamin C, arachidic, behenic, linoleic, oleic, palmitic and stearic acids (fruit kernels). *Haritaki* is one of the important herbs of Ayurveda having properties of antibacterial, anti-fungal, anti inflammatory, antistress, antispasmodic, hypotensive, indurance promoting activity, anti hepatitis B virus activity.

**Useful part:** fruit rind

#### **Ayurvedic properties**

*Rasa:* Kashaya, Tikta, Madhura, Katu, Amla  
*Guna:* Laghu, Ruksha  
*Virya:* Ushna  
*Vipaka:* Madhura  
*Doshaghnata:* Tridosha Shamaka  
*Rogaghnata:* Vata Vyadhi, Shotha, Vrana, Mukha Roga, Kantha Roga, Nadi Daurbalya, Mastishka Daurbalya, Netra Abhishyanda. Drishti Mandhya, Indriya Daurbalya, Agni Mandya and Shoola.

### **3. Vibhitaki (Terminalia bellerica Roxb.)<sup>[10]</sup>**

It is a large tree which belongs to the family Combretaceae, and commonly called as Belliric myrobalan. Chemical constituents present in this drug includes Chebulagic acid, ellagic acid and its ethyl ester, gallic acid, fructose, galactose, mannitol and rhamnose, B- sitosterol and bellericanin (fruits), protein and oxalic acid (seed), oxalic acid and tannins (bark), palmitic, oleic and linoleic acids (kernel and its oil). It is known for Purgative, blood pressure depressant, antifungal, antihistaminic, activity against viral hepatitis and vitiligo,

antiasthmatic, broncho-dilatory, antispasmodic, antibacterial, CNS stimulant, amoebicidal, antistress and endurance promoting activity.

**Useful part:** fruit rind, seed, seed kernal

#### **Ayurvedic properties**

*Rasa:* Kashaya  
*Guna:* Ruksha, Laghu  
*Veerya:* Ushna  
*Vipaka:* Madhura  
*Doshaghnata:* Tridosha Shamaka  
*Rogaghnata:* Shotha-Vedanayukta Vikara, Charma Roga, Granthi Visarpa, Agnimandya, Shvitra, Palitya, Pratishtyaya, Kasa, Shwasa, Swarabhagna, Hridroga, Vrana, Vataavyadi

### **Amalaki (Embllica officinalis Gaertn.)<sup>[11]</sup>**

It belongs to family Euphorbiaceae and popularly known as Indian gooseberry. It is a large deciduous tree and is one of most famous and commonly used herb in Ayurveda. Chemical constituents are; carotene, nicotinic acid, riboflavine, D-glucose, D-fructose, myoinositol and a pectin with D-galacturonic acid, phyllembic acid and phyllembin (Fruits) and fatty acids (Seed oil); 1,2,3,6 trigalloyl glucose, terchebin, corialgin, ellagic acid, alkaloids, phyllantidine and phyllantine (Leaves & fruits). It is also a good source of vitamin C.

**Useful part:** fruit

#### **Ayurvedic properties**

*Rasa:* Amla, Madhura, Kashaya, Tikta, Katu  
*Guna:* Guru, Ruksha, Sheeta  
*Veerya:* Sheeta  
*Vipaka:* Madhura  
*Doshaghnata:* Tridosha Shamaka  
*Rogaghnata:* Paittika Vikara, Daha, Paittika Shirashula, Mootravarodha, Rakta Pitta, Yakrut Pleeha Vikara, Kasa, Swasa, Hridroga, Amlapitta, Parinama Shula, Arsha, Vibandha, Udavarta, Netra Roga, Daha Prashamana, Chakshushya, Nadibalya, Rochana, Deepana.

### **5. Pippali (Piper longum Linn.)<sup>[12]</sup>**

This aromatic slender climber belongs to the family Piperaceae, and popularly known as Indian long pepper. Chemical constituents present in it are two alkaloids; piper longumine and piper longuminine, major alkaloid piperine and sesamin piperidine (stem and fruits). Pippali is one of the commonly using herbs of Ayurveda having the poroperties of Antibacterial, antiinflammatory, insecticidal, antimalarial, CNS stimulant antitubercular, anthelmintic, hypoglycaemic, antispasmodic, anti-giardial, antinarcotic and anti ulcerogenic.

**Useful part:** fruit, root

#### **Ayurvedic properties**

*Rasa:* Katu  
*Guna:* Laghu, Snigdha, Tikshna  
*Veerya:* Anushna Sheeta  
*Vipaka:* Madhura  
*Doshaghnata:* Kapha Vata Shamaka  
*Rogaghnata:* Agni Mandya, Aruchi, Ajeerna, Gulma, Pandu, Amavata, Shwitra, Yakshma, Vibandha, Arsha, Yakrut Vikara, Krimi Roga Shotha, Sheetayukta Vedana, Mastishka daurbalya, Vata Vyadhi, Udara shoola.  
*Karma:* Raktotkleshaka, Medhya, Vatahara, Deepana,

*Vatanulomana, Shoolaprashamana, Jantughna, Balya, Rasayana, Mutrala, Shirovirechana*

#### **Maricha (Piper nigrum Linn.)** <sup>[12]</sup>

Maricha belongs to the family Piperaceae, well known by the name Black pepper. It is a branching and climbing perennial shrub with rooting at the nodes. The chemical constituents include Piperidine, piperidine, ferupenine, dihydroferupenine, piperonal, piperine, piperolenine. It possess the properties of Antioxidant, anticonvulsant, CNS depressant, muscle relaxant, antipyretic, anti-inflammatory, hepatoprotective, antimicrobial, antiulcer, antibacterial, lipolytic, Cyclic oxygenase inhibitory activity.

**Useful part:** fruit

#### **Ayurvedic properties:**

*Rasa:* Katu

*Guna:* Laghu, Teekshna, Ruksha

*Veerya:* Ushna

*Vipaka:* Katu

*Doshagnata:* Kapha Vata Shamaka

*Rogagnata:* Agnimandya, Ajeerna, Yakrit Vikara, Grahani, Krimi, Shwitra, Kilasa, Pama, Tarunya Pidaka, Shotha Vedanayukta, Timira, Pratishtyava Kasa Shwasa, Hikka, Mootra- Krichchhra, Dhvajabhanga, Rajorodha, Kushtha. Charma Roga,

*Karma:* Raktotkleshaka, Srotoshodhana, Deepana, Pachana, Vatanulomana, Krimighna, Sweda Janaka, Lekhana, Nadibalya, Lalasrava Janaka, Kushthaghna, Jwaraghna, Vishamajwara Pratibandhaka, Avrishya.

#### **Shunti (Zingiber officinalis)** <sup>[14]</sup>

It belongs to the family Zingiberaceae. It is a small plant with horizontal jointed tuberous rhizomes. Chemical constituents present in this drug are Heptane, octane, camphene, casinine, gingerol, curcumene, zingerone, cineol, sabinene and myrecene. It has the properties like Anti inflammatory, hypolipidaemic, antiatherosclerotic, antiemetic, antioxidant, antibacterial, antitumoural, hypoglycaemic, inotropic, inhibition in prostaglandin release (dose dependent), Antipyretic, appetiser, uteronic and anti bacterial.

**Parts used:** rhizome

#### **Ayurvedic properties:**

*Rasa:* Katu

*Guna:* Laghu, Ruksha, Teekshna

*Veerya:* Ushna

*Vipaka:* Katu

*Doshagnata:* Vata Kapha Shamaka, Pitta Vardhaka.

*Rogagnata:* Shotha, Switra, Shleepada Amavata, Nadi Daurbalya, Vata Vyadhi, Agnimandya, Aruchi, Chardi, Ajeerna, Koshta Vata, Grahani, Gulma, Anaha, Vibandha, Hridroga

*Karma:* Lekhana, Sheeta Prashamana, Rochana, Bhedana Madaka, Deepana, Pachana, Triptighna, Pittasaraka, Grahi, Garbhasravakara, Vajikarana, Swedajanana, Jwaraghna, Rasayana.

#### **Vidanga (Embelia ribes Burm.)** <sup>[15]</sup>

It is a large scandent shrub which belongs to the family Myrsinaceae. Chemical constituents are Embelin, quercitol, tannin, christembin, embelic acid, fatty ingredients, resinoid, volatile oil and vilangin (fruit), potassium embelate, 4-benzoquinone (plant). Presence of embilin has highlighted by

the action of anthelmintic, antibiotic, antitubercular, antiimplantation, antiovarulatory, antifertility, antiinflammatory, hypotensive.

**Useful part:** fruit

#### **Ayurvedic properties:**

*Rasa:* Tikta, Katu

*Guna:* Laghu, Ruksha Teekshna

*Veerya:* Ushna

*Vipaka:* Katu

*Doshagnata:* Kapha Vata Shamaka

*Rogagnata:* Shiroroga, Akshepaka, Krimiroga, Apasmara, Pakshaghata, Krimidanta, Dantashoola, Agnimandya, Ajeerna, Vamana, Udarashoola, Arsha, Mutrakrichra, Gandamala

*Karma:* Jantughna, Kushthaghna, Shirovirechana, Nadibalya, Deepana, Pachana, Anulomana, Shirovirechana

#### **Loha Bhasma (incinerated iron)** <sup>[16]</sup>

Iron is mentioned third among the *Shuddha Loha*. Iron is a chemical element with the symbol Fe (Latin: *ferrum*) and is the fourth most common element in the Earth's crust.

Chemical and physical properties:

Atomic number: 26

Atomic weight: 55.85

Density: 7.874

Melting point: 1535 °C

Boiling point: 3000 °C

Conductivity: relatively poor conductor of heat and electricity

Dissolution: dissolves in water but process takes many months

Atmospheric exposure: reacts with oxygen and form iron oxide (Fe<sub>2</sub>O<sub>3</sub>)

Chemical response: turns into iron salts when exposed to acids. Remains unaffected by alkalies.

#### **Ayurvedic properties** <sup>[17]:</sup>

*Rasa:* Tikta, Madhura, Kashaya

*Guna:* Sheeta, Sara, Guru, Ruksha

*Veerya:* Sheeta (Ushna according to Rasa Kamdhenu)

*Karma:* Lekhana, Balya, Vrushya, Ayushya, Chakshushya, Rudhirakrut, Vajikara, Rasayana, Prabhuta Gunakrut.

*Doshakarma:* Kaphahara, Tridosahara

*Rogaghna Karma:* Pandu, Kamala, Shotha, Shula, Arsha, Krumi, Shosha, Pliha Roga, Koshta, Rudhira Roga, Prameha, Vandhyatva.

#### **Collection and authentication of raw drugs**

All the above mentioned drugs were collected from the GMP certified Sri Dharmasthala Manjunatheshwara Pharmacy, Kuthpady, Udupi, Karnataka, India. The drug analysis and standardization was done at SDM centre for research in Ayurveda and allied sciences, Kuthpady, Udupi, Karnataka, India.

#### **Apparatus used for the preparation**

Impact pulverizer: it is used for size reduction of the drugs.

Tray driers: for drying the herbs and powder.

Mass mixers: for mixing the powders

#### **Method of preparation**

*Darvyadi Loha Choorna* was prepared by using different parts of medicinally important herbal drugs such as heart wood of *Darvi* (Fig.1), fruit pulp of *Haritaki* (Fig.2), fruit pulp of



*Vibhitaki* (Fig.3), fruit pulp of *Amalaki* (Fig.4), fruit of *Pippali* (Fig.5), fruit of *Maricha* (Fig.6), rhizome of *Shunti* (Fig.7), fruit of *Vidanga* (Fig.8) and *Loha Bhasma* (incinerated iron – Fig 9).

All the herbal drugs were taken in equal quantity and was cleaned and dried properly. Later they were weighed and made into fine powder separately (Fig: 10). To this *Loha Bhasma* was added in quantity equal to each of the herbal ingredient. The whole mixture is mixed homogeneously in a pulverizer and was filtered through sieve number 85. The final product (Fig.11) was carefully packed and was made ready for dispensing. This method of preparation of *Choorna* is according to the Ayurvedic Formulary of India.

#### Precautions taken: [18, 19]

- All the ingredients were dried and powdered separately.
- The fineness of the powder was preferably 80 mesh size per square inch or still finer.
- Powders tend to deteriorate soon due to their hygroscopic nature, hence was preserved in air tight containers. Powders which are not packed air tight will lose their potency in 2 months while well packed and preserved powders can be kept active for 1 year.

**Duration of preparation:** 1 day

#### Organoleptic parameters of finished product:

Colour: light brown

Consistency: fine powder

Smell: specific odour

Taste: Pungent with slight bitter taste

#### Discussion

Iron deficiency anemia is currently the most wide spread micro nutrient deficiency in the world and the WHO estimates that roughly 50% of anemia prevalence can be attributed to iron deficiency. The signs and symptoms of *Pandu Roga* mentioned in Ayurvedic classics resemble with IDA. *Pandu* is a *Pitta Pradhana Tridoshaja Vyadhi* where *Panduta* or paleness is the *Pratyatma Lakshana* of this disease.

In Ayurvedic therapeutics, drugs are used in both forms, crude as well as processed and converted into different pharmaceutical forms. Such preparations should not only be effective but also easy to dispense, administer and agreeable to the patient. *Choorna* is one such form which is an allied *Kalpna* of *Kalka*. For the preparation of *Choorna* with multiple drugs it is advised to powder the drugs individually, because each drug differs from the other in its constituency and constituents. Hence, they are to be separately powdered and mixed together at the end only, to avoid pharmaceutical problems. Individual powdering also helps in obtaining homogenous mixture as it facilitates through miscibility of the components.

*Choorna* does not require any special technique for preparation; hence it is economical compared to other pharmaceutical forms. It can be easily administered to patients who cannot swallow solid dosage forms especially in small children, who refuse to swallow solid forms and also will reduce the risk of choking. As the particle size is very minute, *Choorna* will get easily dissolved in the body fluids, thereby facilitating greater and quicker absorption in lesser time.

*Darvyadi Loha Choorna* with its unique combination of various herbal drugs and *Loha Bhasma*, by virtue of the properties and action of the individual drugs, could be used

efficiently in the management of *Pandu Roga* (IDA). The Anupana mentioned for the medicine are *Madhu* and *Ghrita*.



Fig 1: Darvi heart wood



Fig 2: Haritaki fruit



Fig 3: Vibhitaki fruit pulp



Fig 4: Amalaki fruit pulp



**Fig 5:** *Pippali* fruit



**Fig 9:** *Shudha Loha Bhasma*



**Fig 6:** *Maricha* fruit



**Fig 10:** Powdering of raw materials



**Fig 9:** *Shunti* rhizome



**Fig 11:** Final product: *Darvyadi Loha Choorna*



**Fig 8:** *Vidanga* fruit

**Conclusion**

Plants have been used for the medicinal purposes by man ever since he started to care himself. *Choorna* is one of the pharmaceutical preparations in Ayurveda which is convenient to prescribe in required amount. Ayurveda has been always acknowledged as providing holistic care through safer drugs and more compatibility with the physiological flora of human body. Today, according to the increasing demands, new technologies are being adopted for preparing drugs in large scale using less time and manual work. So, it is absolutely necessary to prepare and standardize the formulations mentioned in the Ayurvedic classics using modern equipments and technologies. To keep this ancient science in pace with the modern period, is essential for the propagation of Ayurveda and also in providing better health care.

**References**

1. Sharma PV. Charaka Samhita: text with English translation, 5<sup>th</sup> ed. Varanasi: Chaukhambha Orientalia. 2010; 1(544):228.
2. Sharma Ajaya Kumar. Kayachikitsa (Dviteeya bhaga), 1<sup>st</sup> ed. Varanasi: Chaukhamba Publishers. 2017; (949):509.
3. Santoskar RS, Bhandarkar SD, Ainapure SS. Pharmacology and pharmacotherapeutics, 16<sup>th</sup> ed. Mumbai: Popular Prakashan Pvt. Ltd; 1999, 471.
4. Satpute Ashok D, Rasendra Sara Sangraha of Sri Gopal Krishna, 1<sup>st</sup> ed. Varanasi: Chaukhamba Krishnadas Academy. 2003; (714):419.
5. Angadi Ravindra, Bhashajya kalpanavijnana, Varanasi: Chaukhambha Surbharati Prakashana. 2011; (511):61-63.
6. Mehra Anil K, Sharma Raghunandan, Ayurvedic Pharmacy (Bhaishajya-Kalpana), Varanasi; Chaukhambha Orientalia. 2012; (380):114.
7. Prasad PVNR. Illustrated Bhaishajya Kalpana.1<sup>st</sup> ed. Varanasi: Chaukhambha Krishnadas Academy. 2008; (485):160.
8. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2000; 1(528):121.
9. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2005; 3(635):282.
10. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2005; 3(635):158.
11. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2005; 3(635):11.
12. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2005; 3(635):472.
13. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2005; 5(572):315.
14. Sharma PC, Yelne MB, Dennis TJ. Database on Medicinal plants used in Ayurveda, CCRAS publication; 2005; 5(572):478.
15. Angadi Ravindra. A text book of Rasashastra (Iatro-chemistry and Ayurvedic pharmaceuticals), 1<sup>st</sup> ed. Varanasi. Chaukhambha Subharati Prakashan. 2014; (702):354-355.
16. Reddy Shekhar. A textbook of Rasashastra, 1<sup>st</sup> ed. Varanasi. Chaukhambha Orientalia. 2011; (516):311.
17. Joshi Devendra, Joshi Geetha. Introduction to Ayurvedic Pharmaceutics, 1<sup>st</sup> ed. Varanasi. Chaukhambha Orientalia. 2014; (268):50.
18. Prasad PVNR. Illustrated Bhaishajya Kalpana, 1<sup>st</sup> ed. Varanasi: Chaukhambha Krishnadas Academy. 2008; (485):159.