

**A CONCEPTUAL REVIEW OF LITERATURE OF PHARMACEUTICAL ACTION OF
SHILAJATU****Dr. Pratibha Prakash Kharat***Assistant Professor in Rasashastra and Bhaishajya Kalpana Department, At SSVP Ayurved College, Hatta (Dist-
Hingoli).***Corresponding Author: Dr. Pratibha Prakash Kharat**

Assistant Professor in Rasashastra and Bhaishajya Kalpana Department, At SSVP Ayurved College, Hatta (Dist- Hingoli).

Article Received on 01/10/2022

Article Revised on 22/10/2022

Article Accepted on 12/11/2022

INTRODUCTION

Rasa Shastra, an offshoot of Ayurveda popular from medieval period, mostly deals with therapeutic utilization of metals and minerals, from Vedic period to Samhita period there was less use of herbo mineral drugs but, from the period of Nagarjuna compounds of herbo-mineral drugs are used profusely. Entire literature on Rasa Shastra shows that the subject covers the entire field of inorganic pharmaceutical preparation like metallics, non metallics and organometallic compounds of Ayurvedic materia medica, this alchemy, mainly deals with the use of metals, minerals, gemstones and their processing.

Rasaushadhies are very effective and are appreciated for their smaller dosages, quick effectiveness and long durability. Since then this branch of Ayurveda has been playing an important and major role in elimination of diseases, potent for immunization, rejuvenation and curing the ailing human being, Apart from the Rasa, there are Maharasa, Uparasa, Sadharana rasa, Sudha varga, Ratna varga, Uparatna varga, Visha varga, Dhatu varga. (RSS).

Maharasa comes as the important one, in not only curing the ailments but also in the process of transformation of mercury to the higher metals, their importance in alchemy process and the other possible reason may be the satva content, as the substance containing satva (metal) in more quantity are classified in maharasa group.

According to Rasa Ratna Samucchaya this group consist of eight substance viz. Abhraka, Vaikranta, Makshika, Vimala, Adrija, Sasyaka, Chapala and Rasaka, and the one which is supposed to be used in curing all the diseases is Shilajatu an important member of this group, according to Anandkanda, all the properties of rasa,

uparasa, parada, ratna, lauha etc. are found together in this single drug, which not only make the body solid like iron but also acts as a rasayana which delay aging and even death.

Describing its importance Charaka has said, there is hardly any curable disease which cannot be alleviated or cured with the aid of Shilajatu. Pharmacological properties of Shilajatu have been explained by Acharya Charaka. Further references of Shilajatu are also present in Sushruta, Astanga Sangraha and in Sharangdhara⁶ Shilajatu is the one of the most important drugs which has been studied pharmaceutically, clinically not only in current era but also since ancient age. It is an exudates of rocks which is mostly appeared and collected in summer season and fulfils the main objectives of Ayurveda by act like both Urjaskara (Rasayana) and Roganuta properties, this wonder drug has vast range of therapeutic uses after processing and administration with different drugs. Ayurveda classics has given types of Shilajatu according to rocks which are enriched with metals e.g. Suvarna, Rajata, Tamra, Loha, Naga and Vanga. The quality of Shilajatu also depends upon geographical region.

MATERIAL AND METHOD**SYNONYMS****Table No. 1: Synonyms of Shilajatu.**

Language	Name	Reference
Sanskrit	Silajit, Shilajit, Silaras	Ghosal (2006), Nadkarni (1954)
Hindi	Shilajit, Ral-yahudi	Ghosal (2006), Nadkarni (1954)
Bengali	Silajatu	Ghosal (2006), Nadkarni (1954)
Tamil	Uerangyum, Perangyum	Nadkarni (1954), Sudarshan (2005)
Arabic	Hajar-ul-musa	Ghosal (2006), Nadkarni (1954)
Persian	Momiaf Faqurul yahud	Nadkarni (1954), Sudarshan (2005)

English	Asphalt, Mineral Pitch,	Nadkarni (1954), Sudarshan (2005)
Bitumen, Jews pitch	-----	-----
Russian	Mumie, Myemu,	Agrawal (2007), Ghosal (1993)
Latin	Asphaltum Punjabinum	Ghosal (2006)

ORIGIN

Many researchers claim that Shilajatu exudes out of rocks in the Himalayan areas in the month of summer season due to intense and bright heat of sun.

It has been mentioned in chikitsa sthana of Charaka Samhita regarding origin of Shilajatu that when the mountain rocks, containing metallic elements in abundant quantity like gold, silver, copper and iron are heated up then the lac like exudate, soft in consistency oozes out.

Another text like Sushruta in its chikitsa sthana specifies the origin of Shilajatu that due to intense and bright scorching heat of sun in the month of jyeshtha and ashadha, a gelatinous substance is secreted from the side of the mountains and this substance is known as Shilajatu and it cures all distempers of the body.

Ashtanga Hridaya and Ashtanga Sangraha have given no specific origin of Shilajatu as compared to the Charaka and Sushruta.

In Rasarnava, a classical rasa text lord Shiva narrated regarding the origin of Shilajatu that when the mountain gets heated up by sun they release the exudates of dhatu called as Shilajatu.

In Rasa Ratna Samucchaya, AnandKand, Ayurveda Prakash, Rasa Tarangini, Rasendra Chudamani, Basavarajeeyam, etc. there is description regarding the origin of Shilajatu, which are almost similar to each other with minor difference.

The texts which followed the concept of Charaka Samhita regarding the origin of Shilajatu are as follows:

- Chakradutta,
- Rasendra Chintamani,
- Rasajalanidhi

VARIETIES

Various scholars classified Shilajatu on the basis of:

- Metallic content
- Smell and colour
- Sasatwa

On the basis of Metallic content

Most of the authors believed that there are only four varieties of Shilajatu following the concept of Charaka

1. Swarna (Gold)
2. Rajata (Silver)
3. Tamra (Copper)
4. Lauha (Iron)

This classification is based not only on the colour and consistency of Shilajatu but also on the presence of different elements present in the particular mountain from which Shilajatu exudes. According to Sushruta, Shilajatu is of six types.

1. Swarna
2. Rajata
3. Tamra
4. Lauha
5. Naga
6. Vanga

The author of Ashtanga Hridaya also followed Sushruta's classification.

Rasa Ratna Samucchaya described 3 types of Shilajatu not mentioning about lauhaja variety.

On the basis of smell and colour

1. Gomutra Shilajatu is blackish brown and it has peculiar odour resembling to cows urine.
2. Karpura Shilajatu is white in colour and is having an odour resembling to camphor.

Karpura or white variety of Shilajatu is mentioned by following texts –

- a. Rasa Ratna Samucchaya
- b. Ayurveda Prakasha
- c. Basavarajiyam
- d. Ananda Kanda
- e. Rasendra Sara Sangraha
- f. Rasendra Purana
- g. Rasa Jala Nidhi etc.

On the basis of Sasatva

Gomutra Shilajatu is again subdivided into two types i.e Sasatva means which contains metal and Nihsatva which does not contain metal, of these Sasatva is better than the other variety. In commentary of Rasendra Sara Sangraha Shilajatu was divided into two types.

- a. Girija
- b. Usharaka

Girija is again divided into 6 types based on the presence of metal in it.

1. Kanchana
2. Rajata
3. Tamra
4. Lauha
5. Vanga
6. Yashada

Usharaka is again divided into two types

1. Kshara or White coloured

2. Red coloured like fire

Table No. 2: Types of Shilajatu according to various classical texts.

Six types	Four types	Three types	Two types
Sushruta Samhita	Charaka Samhita	Rasaratna Samucchaya	Rasarnava
Astanga Hridaya	Chakradatta	Rasendra Chudamani	Ayurveda Prakash
Rasa Jala Nidhi	Bhava Prakash		Rasa Paddhati
Rasendra Sara Sangraha	Ayurved Prakash		
	Rasendra Chintamani		
	Rasa Dhatu Prakash		
	Rasendra Purana		
	Rasa Tarangini		

Text	Types
Rasarnava	1. Patita 2. Apatita
RasaPrakash Sudhakar	1. Gomutra a. Sasatva b. Nisatva 2. Ghanasark
Rasendra Chudamani	1. Gomutra a) Sasatva b) Nisatva 2. Karpura
Rasa Ratna Samucchaya	1. Gomutra a. Sasatva b. Nisatva 2. Karpura
Ayurveda Prakash	1. Girisambhaa a. Suvarna b. Rajata c. Tamra d. Lauha 2. Ksharabhumija
Rasendra Chudamani	a. Suvarna b. Rajata c. Tamra d. Lauha
Rasa Ratnakar	a. Suvarna b. Rajata c. Tamra d. Lauha
Rasa Manjari	1. Acalodbhava 2. Ushodbhava
Rasa Tarangini	a. Suvarna b. Rajata c. Tamra d. Lauha
Rasa Jala Nidhi	1. Gomutra a. Suvarna b. Rajat c. Tamra d. Loha e. Naga f. Vanga 2. Karpura

Shodhana

Shodhana is a process of purification & detoxification by which physical, chemical blemishes & toxic materials are eliminated and substances are subjected for further processing.

Types of Shodhana

There are mainly two types of Shodhana. They are:

1. Samanya Shodhana
2. Vishesha Shodhana

(1) Samanya Shodhana

When all the raw materials of a particular class [i.e. Maharasa, Uparasa, Sadharana rasa, Ratna, etc.] are treated with a specific single procedure for Shodhana, that single specific procedure is known as Samanya Shodhana for that particular class. In case of Shilajatu immersed it in triphala kwatha.

(2) Vishesha Shodhana

When different-different raw materials of a particular class [i.e. Maha rasa, Uparasa, Sadharana rasa, Ratnas, etc.] are treated with different-different specific procedures for Shodhana, those different-different specific procedures are known as Vishesha Shodhana for those particular raw materials. The above collected Samanya shodhit Shilajatu is placed in loha patra and exposed to sunlight, the superficial layer of cream is collected and placed in other loha patra, the collected cream in loha patra when get dried can be use for therapy. Suryatapi Shilajatu is superior because in agnitapi the volatile content etc get evaporated, while the volatile contents get retained in suryatapi method.

Regarding the Shilajatu different purification method have been described by different authors. The main aim is to have a pure drug for human use.

Process of Shilajatu Purification

- Shilajatu should be impregnated in the decoction of the drugs, which are useful in Vata, Pitta, Kapha disorders respectively as per the requirement e.g. Shilajatu should be treated with the decoction of vatahara drugs in case of vatic disorder, it is mentioned that the drug should be subjected to seven impregnations for seven days
- Shilajatu is subjected to bhavana with the juice or kwatha of each of the drugs of Salasaradi Gana drugs.
- For the purification of Shilajatu, drug should be boiled with kshara, amla varga, and gomutra or with ghrita. Purification can also be done in two types by ardraka swarasa, but the exact procedure is not mentioned
- Purification of Shilajatu is done by mixing the drug in cow's milk, Triphala kwatha and swarasa of Eclipta alba in an iron container successively for one day each with the above mentioned drug
- Purified Shilajatu is subjected to a hot steam for 24 minutes or Swedan should be performed in swedna yantra to that Shilajatu which is already triturated with kshara, amla and guggulu for one hour.

Basavarajiyam followed the concept of purification as above. According to Ayurveda Prakash, the same procedure is followed like that of Rasa Ratna Samucchaya and Rasendra Sara Sangraha but with little difference. Surya tapi method of purification has also been mentioned in Rasa Ratna Samucchaya and Ayurveda Prakash For the shodhan purpose of the Shilajatu as well as for removal of external impurities, the drug has to be washed with plain water and to remove the internal impurities it should be triturated with the kwatha of Neem, Guduchi and Indrayava specially in the container made up of iron for 7 times with each drug.

- According to Rasa Tarangini the author has described purification process of Shilajatu in detail, in the hot weather when the sky is free from clouds and there is no wind, four pots made of Lauha patra are to be taken. Good quality Shilajatu is to be put in one of these pots and dissolved in two times of hot water, this solution is to be duly filtered through a piece of cloth and exposed to the sun heat on the upper surface of the solution. This cream like substance is to be removed and put in to another pot mixed with some hot water and kept in sunlight, Again cream like substance at the surface is formed, and this substance is again removed and transferred to the third pot and mixed with hot water. This process is to be continued until whole of the dirt or undesired material separate from the pure substance and set at the bottom. Pure cream like substance collected as Shilajatu may be taken out carefully, excluding water and sediments
- Shodhana of karpura Shilajatu is done by trituration with the decoction of Cardamom and drying

MARANA OF SHILAJATU

Marana process is not applicable to Shilajatu even then some texts stated about Marana of Shilajatu. According to Rasa Ratna Samucchaya and Rasendra Chudamani for the Marana of Shilajatu it should be mixed with Gandhaka, Manahshila, and Hartala and then triturated with lime juice. This mixture is subjected for incineration in 8 upalas. Ayurveda Prakash followed the same process as that of RRS but the difference was in the incineration where AP mention about kapota puta instead of gajaputa Rasendra Chudamani and Rasa Paddhati believed that Shilajatu should be mixed with equal quantity of Gandhaka and Hartala and after triturating it with the lime juice it should be subjected to kapota puta. However Rasendra Chudamani stated that marana should not be performed for karpura gandhi Shilajatu.

Table 3- Rasa of Shilajatu according to different authors.

Texts Rasa	Amla	Tikta	Kashaya	Madhur
Charak Samhita	Anamla	+	+	
Sushruta Samhita	+	+	+	
Astanga Hridaya	+	+		
Rasa Ratnakara	Anamla		+	
Rasendra Sarasangraha	+	+		
Rasa Ratna Samucchaya Swarna (b) Raupya(c) Tamra		+		+
Ayurveda Prakash	+	+		
Rasa Tarangini	+	+		
Rasa Paddhati	Anamla	+		+
Rasa Kamadhenu		+	+	+

Table 4- GUNA.

Varieties	Guna	Virya	Vipaka	Karma
Swarna	Sheeta	Sheeta	Katu	Paramrasayana
Rajata	Sheeta	Sheeta	Madhura	ghna, Panduroganashaka
Tamra	Ushna	Sheeta	Katu	Lekhana
Loha	Sheeta	Sheeta	Katu	yana, Vrishya, Yogavahi
Naga	Ushna, mridu guna	Sheeta	Katu	
Vanga	Sandhra	Sheeta	Katu	

SPECIFIC ACTION OF SHILAJATU

It has following specific actions which are given below -

- Chhedana karma
- Vrishya
- Balya
- Lekhana
- Yogavahi
- Rasayana

DOSHA PRABHAV OF SHILAJATU

Swarna Shilajatu- Vata pitta shamaka.

Rajata Shilajatu- Kapha pitta shamaka [exception kapha vata

Shamaka, pittashamaka, pittavatashamaka].

Tamra Shilajatu - Kapha vataghna.

Physical properties

1. Hemagarbha Shilajatu : Japapushpanibha, guru, gomutra Gandhi
2. Raupyagarbha Shilajatu :Pale or white, sheetal, guru, gomutra Gandhi
3. Tamragarbha Shilajatu :Blue or mayurkanthabha, guru, tikshna, ushna, gomutragandhi
4. Lauhagarbha Shilajatu :Jatayu pakshabham, Guggulu sradish, guru, black, bitter, gomutra gandhi

USES

Charak says "there are hardly any curable diseases which can not be controlled or cured with the aid of Shilajatu." It is a powerful tonic and alternative useful in a variety of diseases, when administered at right time, well prepared and in the right manner, It removes old age and disease, gives great firmness of the body, increases intelligence and memory and promotes prosperity.

Table 5- Sroto wise tabulation of the list of disease in which Shilajatu is prescribed by various texts.

Srotas	Diseases
Pranavaha	Kasa, Svasa, Hikka, Hrdroga, Urakshata.
Annavaha	Agnimandya, Sula, Amlapitta, Amadosha, chardi, gulma, visha
Udakavaha	Udara
Rasavaha	Sotha, Kshaya, Jvara, Pandu, Amavata.
Raktavah	Arsha, Kamala, Vatarakta, Visarpa, Kushtha.
Mamsavaha	Galaganda, Granthi, Apachi, Arbuda, Arsha.
Medovaha	Atisthaulya, Meda, Prameha, Madhumeha.
Manovaha	Unmada, Apasmara, Murccha.
Sukravaha	Retodosha, Phiranga, Upadamsha.
Mutravaha	Ashmari, Mutraghata, Mutrasarkara, Mutrakrcra.

Use of Purified Shilajatu and its dose

Purified Shilajatu taken with milk in a suitable quantity or dose has the effect of increasing vitality, curing and preventing senility, strengthening the system and increasing memory. Shilajatu produces an appreciable

effect. The dose play very important role in the action of the drug, If the dose is less than the mentioned one, then the drug fails to act and if the dose is more, then it causes hazardous effects.

Table No.6: Dose of Shilajatu according to Charaka Samhita.

Types	Quantity	Duration
Uttama	1 pala (4 tola)	7 weeks
Madhyama	½ pala (2tola)	3 weeks
Avara	1 karsha (1tola)	1 week

Anupan

Shilajatu has versatile therapeutic uses after administered with different anupan. Rasa tarangini gave detailed description of different uses of Shilajatu.

Table No.7: Indication and mode of administration of Shilajatu according to Rasa Tarangini.

No	Anupana	Disease
1.	Honey	Mutrakricchra
2.	Dashamula kvatha + sugar	Asthilika, vata basti
3.	Varunadi kvatha	Mutraghata & asmari
4.	Guduchi kvatha	Mutraghata & mutrakricchra
5.	Sugar + camphor	Mutatita, mutra jathara
6.	Gokshura kvatha	Mutrakricchra
7.	Kakolyadi gana	Klaibya
8.	Lauha bhasma, Svarna makshika bhasma Ghee, Haritaki, Vidanga	Rajayakshma
9.	Viratarvadi gana kvatha	Mutrakricchra
10.	Sugar + milk	Pain due to prameha
11.	Guggulu + Sunthi + Pippali + Gomutra	Uruh stambha
12.	Lauha + Svarna makshika bhasma	Rakta vridhhi
13.	Arjuna kvatha for 2 months	Hrid roga
14.	Agnimantha svarasa for 2 months	Sthaulya
15.	Bhavana with Salasaradi gana kvatha for 21 days and use with same decoction for 2 months	Madhumeh, Asmari Mutrasarkara
16.	Pippali, Pashanabheda	Prameha
17.	Ela churna + washings of rice	Mutraghata, Mutrakricchra
18.	Kapoor (Ext. Appl.)	Wounds / Bruise
19.	Haridra churna	Kumbha kamala
20.	Lauha + Svarna bhasma bhavana with Sarjakavatha (Irtatti).	Masurika Jvara etc.

Pathya-Apathya

Pathya-Pathya plays an important role in treatment of disease. Purified Shilajatu should be taken with milk, butter, meat soup, yusha, gomutra, hot water and different types of prepared kwatha of said drugs.

Apathya

While taking Shilajatu one should avoid foods which are fried, roasted (with or without oil), sour, fermented and heavy. During the administration of Shilajatu the following materials are contraindicated.

1. Vidahi
2. Guru
3. Kulatha
4. Kapota mamsa.

Kulatha is kashay rasa, ushna virya. So also kapota mamsa. Shilajatu is katu, kashaya, Tikta rasa and ushna virya. So the above properties causes untoward effect in

the body. Other school of thought believes in the idea that kulatha should not be given till his complete life instead milk should be given.

The man who takes Shilajatu should also avoid physical exercise, exposure to sun rays and exposure to wind, heavy food, sour, pungent and fermented food should also be avoided.

YOGAS

Shilajatu is an important drug, which is used in many diseases as a single drug or as ingredient of different yoga.

Table No. 8: Shows the Shilajatu containing important yogas.

Yoga	Uses	Reference
Yakshhari Lauham	Rajyakshma	Bhai. Rat.Ch 14/83
YakshamantaLauham	Swarabhanga, Kshayaja kasa, kantikarak, Agnideepak	Bhai. Rat.Ch 14/ 84-85
Shilajatwadi lauha	Kshayaroga (TB)	Bhai. Rat.Ch 14/86
Eladi churnam	Prameha, Mutrakriccha	Bhai. Rat.Ch.33/34
Chandrakalagutika	All types of Prameha	Bhai. Rat.Ch.37/67-68
Pramehakulantak ras	Prameha, Mutrakriccha, Ashmari, Mutraghat, Aruchi, Pandu, Kamala, Halimaka	Bhai. Rat.Ch.36/78-83
Vedavidhavati	Prameha	Bhai. Rat.Ch.37/84-88
Mehavajra ras	Severe Mutrakriccha, Prameha	Bhai. Rat.Ch.37/94-97
Silajatuka prayoga	Madhumeha, Sarkara, Ashmari	Bhai. Rat.Ch.37/58-61
Chandraprabha Vati	For all 8 types of Mutrakriccha	Bhai. Rat.Ch.37/102-110
Chandraprabha gutika	4 types of Ashmari, Mutraghat, Pandu, Kamala, Halimaka, Kasa, Swasa, Kustha	Gada Nigraha I. Khand P.248
Meghanadirasa	Prameha	Bhai. Rat.Ch.37/146-148
Sarveshwariras	Prameha Madhumeha,	Bhai. Rat.Ch.37/180-183
Lauha Rasayan	Vata sleshma vikara,kustha,jwara, Prameha, Pandu, Kamala,shotha, Rasayan,Vajikarana, Kantivardhak	Bhai. Rat.Ch.39/33-42
Dadimadhyam Ghritamahat	Prameha Mutraghat, Ashmari Mutrakriccha, Raktapitta, Sannipatik vastigatavikar, Balavardhak	Bhai. Rat.Ch.37/216-221
Murcchantak Rasa	All types of Murccha	Bhai. Rat.Ch.21/13-14
Vataraktantak Rasa	Alltypes of Vataroga ad Vatarakta	Bhai. Rat.Ch.27/43-47
Shilajau prayoga	Vatarakta	Bhai. Rat.Ch.27/67
Shilajatyadi Yoga Chatusayam	Urustambha	Bhai. Rat.Ch.28/7
Prabhakar Vati	All types f Hridya roga	Bhai. Rat.Ch.33/42-43
Chintamani Rasa	Hridya roga, Prameha, Swasa, kasa, Balavardhak, Pustikarak	Bhai. Rat.Ch.33/44-48
Shilajatwadi Prayoga	Udara roga	Bhai. Rat.Ch.40/40-64
Varishoshan Ras	Kaphavikar, Agnimandya, Pleehavridhi, Pandu, shoola, Udara, Kustha roga	Bhai. Rat.Ch.40/100-115
Yakrit Plihari Lauham	Pleha & Yakri vridhi, Udara roga, Pandu, Kamala, Halimaka, shotha, Mandagni, Aruchi	Bhai. Rat.Ch.41/123-127
Branhaghritam	Pleehodar, Dushyodar,Udara roga	Bhai. Rat.Ch.42/231-233
Lankeswara ras	Kustha	Bhai. Rat.Ch.54/138-140

CONCLUSION

In the above conceptual study it show that the shilajit is very usefull in various disease and show the long term effect in ayurveda. In conclusion, the shilajit is naturally occurring mineral it is widely used in Indigenouse system of medicine for the cure of variety of diseases and to accelerate the process of innovation. it is found in mountain region it contain 85 minerals. The present study describes on shilajit highlighting the uses, physical properties, phytochemical screening, purification, pathya, apathy, different yogas, chemical components.

REFERENCES

1. Baghel M.S., Researches in Ayurveda, Mridu Ayurvedic Publications and Sales, 2005, Jamnagar.
2. Bhagwat Sri Govinda Padacharya, Rasa Hridaya Tantra, Translated into Hindi by Acharya Daulatrama Rasasastri, 2nd bhasma,IPGTRA, 2004, Jamnagar.
3. Bhatt Sri Gopala Krishna, Resendra Sara Samgraha, Edited by Vaidya Satyarth Prakash, 1 Edition Chaukhambha Publishers, A House of Ayurvedic & Indological Books, 2001, Varanasi. st Edition, Krishnadas Academy Publishers,1992, Varanasi.
4. Bhatt Yasodhar, Rasa Prakasha Sudhakar, Edited by S.N. Mishra, Chowkambha Orientalia, Varanasi, Reprint 2009, Varanasi.
5. Bhava Mishra, Bhava Prakash Nighantu with Hindi commentary by Sri B. S. Mishra and Sri Rupalalji Vaishya, 11th Bonesi M, Loizzo MR, Conforti F, Passalacqua NG, Saab A, Menichini F, Tundis R. Edition, Chaukhambha Sanskrit Bhawan, 2007, Varanasi.
6. Bhava Mishra, Bhava Prakash Nighantu, Haritakyadi Varga, English translatiobn by KRS Murthy, Vol 1, Edition 2008, Chaukhamba Krishna

- Das Academy, Varanasi.
7. Berberis aetnensis and B. libanotica: a comparative study on the chemical composition, inhibitory effect on key enzymes linked to Alzheimer's disease and antioxidant activity.
 8. C. D. Gribble, Rutley's Elements of Mineralogy, 27th Edition, CBS Publishers & Distributors, Delhi.
 9. Charaka Samhita, Ayurveda Deepika commentary, Chowkambha Sanskrit Sansthan, 1984, Varanasi.
 10. Dole Vilas A., A Text Book of Rasa Shastra, Chaukhamba Sanskrit Pratishthan, 2006, Delhi.
 11. Acharya Charaka, Charaka Samhita, Volume I Edited with Charaka Chandrika, Hindi commentary by Dr. Brahmanand Tripathi, Chaukhamba Surbharati Prakashan, reprint 2001, Varanasi.
 12. Acharya Charaka, Charaka Samhita, Volume II Edited with Charaka Chandrika, Hindi commentary by Dr. Brahmanand Tripathi, Chaukhamba Surbharati Prakashan, reprint 2002, Varanasi.
 13. Acharya Sharangdhar, Sharangdhar Samhita Edited by Shri Radha Krishna Parashar, 3rd Edn. Baidhyanath Ayurveda Bhawan, Patna.
 14. Acharya Sharangdhar, Sharangdhar Samhita Edited by Smt. Shailja Srivastava, Madhyam Khand, Chapter-1, Chaukhamba Orientalia, Varanasi. Edn. Baidhyanath Ayurveda Bhawan, Patna.