ABSTRACT

Background: Pravala (Coral) is one among the nine ratnas (precious stones), as categorized by all the texts of Rasashastra. Pravala is widely used in ayurvedic practice being a rich source of natural calcium and various trace elements. Objective: To critically review and highlight potential natural sources of calcium:pravala from classical and contemporary literature with recent research works. Data source: Ancient Indian literature, Classical texts of Rasa shastra from Rasa Hridaya Tantra (9th Cent. A.D) to Rasa Tarangini (20th Cent. A.D). Materials and Methods: Present work has reviewed and compiled a detailed description of Pravalaparyaya (synonyms), utpatti (Occurrence), bheda (types), grahya/agrahya laxanas (Considerable/Nonconsiderable properties for medicinal preparations), guna karma (Pharmacological and therapeutic properties), shodhana (Purification), Marana (Incineration), pishtikalpana (fine powder), matra (Dose) amayika prayoga (Therapeutic utility) and Yogas (Compound formulations) with its contemporary science relevance. Result: Data from the critical review of classical and contemporary research works. Conclusion: Pravala being natural source of calcium, is administered in the form of Bhasma (Calyx) and Pishti (Paste) for curing ailments such as Amlapitta (Hyperacidity), Netra Roga (Eye diseases), and Hridaya Roga (Cardiac diseases). Pravala is having pitta shamaka (Soothing effect) and Asthiposhaka (Bone mineralization) properties ideally indicated to treat mainly disorders of pitta aggravation and asthikshaya (Calcium deficiency).
INTRODUCTION

In Ayurveda, drugs are categorized depending upon the origin like Jangamama dravyas (Drugs of animal origin), Audbhida dravyas (Drugs of plant origin), and Parthiva dravyas (Drugs of mineral origin). In Rasashatra (Indian alchemy), the drugs which are rich in calcium may be of animal origin or mineral origin are grouped under the Sudhavarga dravyas. The exact meaning of the word “Sudha” means ambrosia or nectar. Sudha Varga includes Parthiva Dravyas like Sudha (Lime), Khatika (Chalk), Godanti (Gypsum), etc. and Jangama Dravyas like Samudraphena (Cattle fishbone), Shankha (Conch shell), Shukti (Oyster), Kaparda (Cowries), Kurma pristha (Tortoise hard shell), Kukkutanda twak (Eggshell), etc. Among these, Kaparda(Cowries) has been grouped under Sadharana Rasa, whereas Pravala (Coral) and Mukta (Pearl) are grouped under Ratna Varga (Precious stones).

The Marine system is rich in organic wealth and calcium is an important mineral constituent of marine life. The major sources of calcium for humans from the marine system include fishbone, shellfish, crustacean shells, coral, and seaweed. Coral calcium is a natural source of marine calcium; containing 24% calcium, 12% magnesium, and more than 70 minerals. Ayurveda an Indian system of medicine has mentioned several preparations of calcium for treating bone metabolic disorders such as osteoporosis. Pravala (Coral) in the form of Bhasma and pishti are rich in the natural source of calcium and are used as a calcium supplement to treat bone metabolic disorders, osteoporosis, and other bone diseases.

Coral is mentioned as Pavalam in the Siddha system of medicine and is indicated to cure anorexia, excess hunger, diabetes mellitus, skin disorder, ulcers, puerperal sepsis, delirium, oligospermia, eye diseases, rickets, and many diseases for which it is used in Ayurveda also.

Coral is a precious drug with various uses in the Unani system of medicine too. For medicinal purpose, roots and branches of coral are used separately. It is recommended in treating stomatitis, hemoptysis, cough, phthisis bulbi, and asthma. The ash is used as a tooth powder for strengthening gums and teeth, as Surma (Kajal) for treatment of eye diseases, as eardrops with oil for alleviating ear ache, and as an aqueous lotion in leprosy. It is also used for treating anemia, high fever, and hemolytic jaundice.
MATERIALS AND METHODS

Present work has reviewed and compiled a detailed description of Pravala from ancient Indian literature, Classical texts of Rasa shastra from Rasa Hridaya Tantra (9th Cent. A.D) to Rasa Tarangini (20th Cent. A.D) and Contemporary science including previous research works.

Historical Review:

Pravala has been mentioned in almost all the prehistoric as well as recent treaties of Ayurveda. Pravala is having its existence in the Vedic works of literature too. People of India are using Pravala for ages along. In the past it was used for ornamental purposes later on in the Samhita Period, it came to the field of medicine, and afterward in the classics of Rasashastra, Pravala has been recognized as an important medicine in the treatment of Raktapitta, Klaibyata, etc.

In the Vedas, Pravala has been mentioned with other metals and minerals like Haratala (Arsenic trisulphide) and Manashila (Arsenic disulfide) etc. The author of Manu Smriti has also quoted about the treading of Pravala. Vishnu Purana quotes that there are seven mountains in Kushadwipa (Kusha Iceland). Out of them, one is called Vidruma which is a synonym of Pravala. Garuda Purana has narrated the occurrence and examination of Pravala. In Maha Bharata and Shrimad Bhagawad Geeta texts, Pravala is were found to be used for ornamental purposes.[7]

In Charaka, Samhita, Pravala is mentioned to be used as an external medicine as a paste for reducing high body temperature in jwara (fever) and internally in hikka (hiccough), shwasa (asthma), Kasa (cough), and kaphaja mutrakricha (Urinary tract infection).[8] Sushruta Samhita has mentioned Praval aand Vidruma as a synonym and has an indication in ophthalmic disorder as Collyrium and internally in udara shoola (colic abdominal pain).[9]

Treaties of Rasashastra:

1. **Rasa Hridaya Tantra** (9th Cent. A.D): In this text Pravala is used as Kalka (bolus) for the preparation of Sarana Taila for Parada Kramana Samskara.[10]

2. **Rasa Paddhhati** (10th Cent A.D): This text explains the entire process of preparation of Pravala Bhasma. In the field of medicine, Pravala is indicated as Rasayana (Rejuvenator),
Vajikarana (aphrodisiac), Kshataja kasahara (Cough due to injury) and Madhumehahara (diabetes).[11]

3. **Rasarnavam** (12 Th Cent A.D): This text has compared Pravala with the lips of Padmini Stri. As the text deals with Dhatu Vada (conversion of lower metals into higher ones) and Deha Vada (therapeutic preparation) it indicates the use of Pravala in Abhara Dravana, Abhara Dravana, Rasa Ranjana and Khotha Jarana. As the emphasis of the text is on Dhatu Vada, the author does not highlight much on the medicinal uses of Pravala.[12]

4. **Ananda Kanda** (12th Cent. A.D): In this text, Pravala has been mentioned in both Amritikarana and Kriyakarana Vishrantis. In Amritikarana Vishrant, it is used for Dharana purposes and in Kriyakarana Vishrantiit is used for Dhatu Vada.[13]

5. **Rasa Ratnakara** (12th Cent. A.D): In this text, Pravala is indicated in Rajyakshma (tuberculosis), Unmada (insanity), as a Rasayana (rejuvenation) and Vajikarana (aphrodisiac). The text has also elaborated two methods of making artificial Pravala.[14]

6. **Rasa Prakasha Sudhakara** (12th Cent A.D): In this text qualitative physical property and Shoshana (Purification), Marana (Incineration) of Pravala has been discussed. It indicates Pravala in Rajyakshma and Unmada and as a Rasayana and Vajikarana. There is also one method to make artificial Pravala.[15]

7. **Rasendra Chudamani** (13th Cent. A.D): This text mentions Pravala under the broad heading of Navagraha Prasadakara Ratnas and indicates Pravala for Mangala Graha (mars) and mentions its use as Rasayana in the name of Pravala Rasayana.[16]

8. **Rasa Ratna Samuchchaya** (13th Cent A.D): The author has explained physical characters for its qualitative analysis, shodhana and marana processes, and their properties. It is indicated in Kshaya, Raktapitta, Kasa, Netra Roga (eye diseases) and Vishabhu shamaka (Alleviates effects of poison and evil spirits), etc.[17]

9. **Rasendra Sara Samgraha** (13th Cent. A.D): This text mentions the physical characters of Pravala for quality control and processes for Shodhana, Marana with its medicinal uses.[18]

10. **Rasendra Chintamani** (14th Cent. A.D): In this text Pravala has been mentioned under Navagraha Prasadakara Ratnas. Its Marana and uses are also indicated.[19]
11. **Ayurveda Prakasha** (17th Cent. A.D): The author described the full description regarding habitat, *shodhana*, *marana* and properties, etc of *Pravala*. He also indicates *Pravala* use as *rasa ranjaka*.[20]

12. **Yoga Ratnakara** (18th Cent. A.D): In this text *Shodhana, Marana* has been given for *Pravala* and is indicated in *Jwara, Rajyakshma, Urakshata* (injury to chest), *Dhanurvata* (opisthotonus), *Gulma* (abdominal lump), *Prameha* (diabetes) and in *Netra Rogas*. [21]

**Contemporary Era:**

1. **Siddha Bhaishajya Manimala** (19th Cent. A.D): The first text of its kind, to mention the use of *Moola Pravala* (coral root) to treat *Prameha*. [22]

2. **Rasendra Purana** (19th Cent. A.D): This text describes four types of *Pravala* according to the *Varna Vyavastha* i.e. *Brahmana, Kshatriya, Vaishya* and *Shudra*. [23]

3. **Rasa Jala Nidhi** (20th Cent. A.D): In this text also, there is a reference of four types of *Pravala*. Here the author has given one synonym of *Pravala* as *Jaladhibhagbha Kitam*. [24]

4. **Rasa Tarangini** (20th Cent. A.D): In this complete description of *Pravala* and its uses are available. In the commentary, the commentator has mentioned two types of *Pravala* i.e. *Moola* and *Shakha* and mentioned that *Shakha* should be used as a medicine. [25]
Table No.01: Synonyms of *Pravala* (Coral)*[26],[27],[28],[29],[30]*

| Sl.No | Synonyms               | Rasamrita | Ananda kanda | Rasa jalanidhi | Ratna vignana | Rasa tarangini |
|-------|------------------------|-----------|--------------|----------------|---------------|----------------|
| 1     | Pravala                | +         | +            | +              | +             | +              |
| 2     | Videirma               | +         | +            | +              | +             | +              |
| 3     | Bhoomaratna            | +         | +            | +              | +             | +              |
| 4     | Latamani               | +         | +            | +              | -             | -              |
| 5     | Ambodhi vallabha       | +         | -            | +              | -             | -              |
| 6     | Sagara garbha keeta    | +         | -            | -              | -             | -              |
| 7     | Angarakamani           | -         | +            | +              | -             | -              |
| 8     | Ambodhi pallava        | -         | +            | -              | -             | -              |
| 9     | Raktaaanga             | -         | +            | +              | -             | -              |
| 10    | Raktaankura            | -         | +            | -              | -             | -              |
| 11    | Rakta deha             | -         | -            | +              | -             | -              |
| 12    | Jaladhi garbha keeta   | -         | -            | +              | -             | -              |
| 13    | Pra Abdhi              | -         | -            | -              | +             | +              |
| 14    | Jantu valaka           | -         | -            | -              | +             | -              |

*Bheda* (Category/Types):

**Based Utpatti (Occurrence) and Rupa (Appearance):**

The lumpy and slender variety of *Pravala* is widely used for medicinal purposes. Both are red-colored due to pigmentation. Coral contains more calcium and some amount of iron, magnesium, and phosphorus. The lumpy variety of *Pravala* is cheaper than the slender variety. As shown in figure one, the lumpy porous variety is called *Pravala moola* and the slender variety is called *Pravala Shaka*.[31]
Based on *Varna* (Category) and *Guna* (Properties)*[^32][^33]*

1. **Brahmana jaati pravala** - It is best of corals, having *Aruna varna* like the blood of rabbit. It is *Snigdha, komala, Manorama, sukhavedhya*.

2. **Kshatriya jaati pravala** - It is having varna of *Japa, bandhuka, sindhura, dadimapushpa*. It is *Kathina, asnigdha, durvedhya*.

3. **Vaishya jaati pravala** - It is having varna of *palahsakusuma, paatala*. It is *snigdha, varnaadya with mandakanthi*.

4. **Shudra jaati pravala** - It is having varna of *raktautpaladala*. It is *Katina, chiratdhyuti, vayuvedhya*.

*Grahyatva and Agrahyatva*[^34][^35]

The grahya lakshanas are *Ati Rakta* (Deep Red Colored), *Avakra* (Symmetrical), *Avrana* (without any laceration), *Aarakta* (Deep Red Colored), *Aayata* (Vertically expanded), *Komala* (Smooth), *Guru* (Heavy), *Gunja phalvat* (Red-colored), *Cheerdhuyati* (Possess a luster for a long time), *Chheedrarahita* (Non-porous), *Japakusuma sannibham* (Bright Red Colored), *Drudha* (Hard), *Darya* (Wearable), *Deergha* (Long), *Pakwa bimba phala chhayam* (Bright Red Colored), *Pinda* (Cylindrical), *Ranga gatram* (Possessing color in all parts), *Vritta* (Circular), *Shishira vihina* (Without any porous structure), *Snigdha* (Viscous), *Vidhuti* (Lustrous).

The agrahya lakshanas are *Sharadabhamam* (Extreme Whitish), *Sookshma* (Small), *Vakaram* (Uneven), *Rooksha* (Dry), *Viddha* (Broken), *Krishna* (Blackish), *Laghu* (Light), *Gouranga* (White), *Jalakranta* (Possesses haziness), *Kotaram* (Porous).
### Table No. 02: Zoological categorization[^36]

| Kingdom       | Animalia               |
|---------------|------------------------|
| Subkingdom    | Radiata                |
| Phylum        | Cnidarians             |
| Subphylum     | Anthozoa               |
| Class         | Anthozoa               |
| Subclass      | Octacorallia           |
| Order         | Alcyonaceae S          |
| Suborder      | Scleraxonia            |
| Family        | Coralliidae            |
| Genus         | Corallium              |
| Species       | *Corallium rubrum*     |

**Habitat (*Prapti sthana*)**

Coral reefs are found in coastal areas of the Pacific, Indian, and Atlantic oceans.[^37] In the 8129 km coastline present in India the reef formation is restricted to four major areas viz, Gulf of Kutch, Gulf of Mannar, Lakshadweep, and Andaman Nicobar Islands. Coral reefs of the Indian Ocean were built up during the tertiary and quaternary periods. Coral reefs are restricted mainly in seven regions of India.[^38]

1. Coral reefs on Goa coast.
2. Coral reefs in Kerala coast.
3. Coral reefs in Palk Bay.
4. Coral reefs in Gulf of Kutch.
5. Coral reefs in the Gulf of Manner.
6. Coral reefs in Lakshadweep islands.
7. Coral reefs in Andaman and Nicobar Islands.

[^36]: Information about zoological categorization.
[^37]: Data on habitat distribution.
[^38]: Historical aspects of coral reef formation.
Macroscopic characters

In appearance, it is a small shrub in a pendant or reverse position. It occurs in slender, cylindrical, and generally branched pieces of brick red color. It is made up of numerous minute pieces and each piece is minutely and longitudinally uneven. Its smell resembles frankincense. It easily breaks with a crackling sound. In the raw state, the stems and branches are covered with a cortical substance which is the habitation of soft small polypi.\textsuperscript{39}

Microscopic characters

A medullary zone surrounded by a circular domain made up of concentric rings can be seen through an axial view of the skeleton. These concentric rings are annual and expose the cyclic variation of organic matter and Magnesium/Calcium ratio; thus, both organic matter and Magnesium Calcium ratio can be used to date red coral colonies. The growth rings display wavelets. The internal structure of each wavelet results from the stacking of layers with tortuous interfaces.\textsuperscript{40}

Table No. 03: Physical Properties of Corals\textsuperscript{41}

| Sl. No. | Parameters          | Physical Properties                                                                 |
|---------|---------------------|--------------------------------------------------------------------------------------|
| 1.      | Color               | Flesh pink, deep rose-red, salmon pink, red to dark blood red, white, orange, black, and grey. |
| 2.      | Hardness            | 3.5 to 4.0                                                                           |
| 3.      | Density             | 2.6 to 2.7                                                                           |
| 4.      | Refractive index    | 1.486 to 1.658                                                                      |
| 5.      | Specific gravity    | 2.65 to 2.7                                                                          |
| 6.      | Transparency        | Semi-translucent to opaque                                                           |
| 7.      | Crystal system      | Amorphous                                                                            |
| 8.      | Luster              | Vitreous, waxy                                                                       |
| 9.      | Cleavage            | None                                                                                 |
| 10.     | Birefringence       | 0.160                                                                                |
### Table No. 04: Chemical Constitution of Corals[^42]

| Sl. No | Chemical Constituents       | Percentage |
|--------|----------------------------|------------|
| 1.     | Chemical formula           | CaCO₃      |
| 2.     | Carbonate of lime          | 7-8%       |
| 3.     | Magnesium carbonate        | 3%         |
| 4.     | Sand                       | 2%         |
| 5.     | Iron                       | Traces     |
| 6.     | Magnesia                   | Traces     |
| 7.     | Organic matter and water   | 16%        |

[^42]: Table No. 04: Chemical Constitution of Corals

### Table No. 05: Rasa panchaka of Pravala (Coral)[^43]

| Drug       | Rasa                        | Guna       | Veerya | Vipaka  | Prabhava                  |
|------------|-----------------------------|------------|--------|---------|---------------------------|
| Pravala    | Madhura, Amla, Kashaya      | Laghu,     | Sheeta | Madhura | Balances Vata, pita, kapha |

[^43]: Table No. 05: Rasa panchaka of Pravala (Coral)

### Table No. 06: Shodhana (Purification)[^44],[^45],[^46],[^47],[^48]

| Sl. No | Classical reference       | Shodhana of Pravala                                                                 |
|--------|----------------------------|------------------------------------------------------------------------------------|
| 1      | Rasa pradeepika            | Bhayana in sahadevi patra swarasas                                                |
| 2      | Rasendra Chintamani        | Swedana in dolayantra with jayanti swarasas                                         |
|        |                             | Swedana in dolayantra using sarjakshara, yavakshara andtankanadrava                |
|        |                             | Swedana in dolayantra with go dugdha                                                 |
| 3      | Ratna Vignanam              | Swedana in dolayantra using tanduliya jala for 3 hrs                               |
|        |                             | Swedana in dolayantra for 1 yama with sarja ksharajala                              |
|        |                             | Swedana in dolayantra for 1 yama using jayanti swarasas                             |
| 4      | Rasa Tarangini             | Swedana in dolayantra with Jayanti swarasas for 1 yama                             |
|        |                             | Swedana in dolayantra with swarji kshara jala for 1 yama                            |
|        |                             | Swedana in dolayantra with tanduliya drava for 1 yama                              |
| 5      | Rasa Pradeep               | Swedana in dolayantra with jayanti swarasas                                         |

[^44]: Table No. 06: Shodhana (Purification)

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**Citation:** Geeta G Gadad et al. Ijppr.Human, 2022; Vol. 23 (3): 34-57.
Table No. 07: Marana (Incineration) of Pravala[^49],[^50],[^51],[^52],[^53],[^54]

| SNo. | Reference                  | Method                                                                                                                                 |
|------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Ratna Vignanam             | *Swedana* in *dolayantra* using *tanduliya jala* for 3hrs \* *Swedana* in *dolayantra* for 1 yama with *sarja ksharajala*. \* *Swedana* in *dolayantra* for 1 yama using *jayanthi swarasa*. |
| 2    | Rasa Tarangini             | *Pravala* is made into a fine powder, ground along with *godugdha*, made into *chakrikas* dried, placed in *sarava*, sealed, dried, and subjected to *puta*. The same procedure is mentioned by using *jayanthi swarasa* and *shatavari swarasa*. |
| 3    | Rasa Tarangini             | *Shodhita pravala* is made into a fine powder, grounded along with leaf juice of *kanya*, made into *chakrikas*, dried, placed in *sarava*, sealed, and allowed to dry. It is then subjected to *puta* for 3 times. |
| 4    | Rasendra Chintamnai       | *Manahsila, Gandhaka, haratala* are made into *kalka* form by adding *lakuchaswarsa*. It is then applied over *Pravala* and subjected to *puta* for 8 times (*samanya shodhana* of *ratnas*). |
| 5    | Rasendra Sara Sangraha    | *Pravala* is subjected to *Bhavana* in *khalwa yantra* with *streedugdha, chakrikas* are prepared, dried, arranged in *sharava, sandhi bandhana* is done and cooked over *tivragni* for 2 *prahara* to obtain *Bhasma*. |
| 6    | Rasa Pradeep              | *Pravala* is heated and dipped in the juice of *kumari, tandula jala, stree kshira* for 7 times in each in order |

**Pishti kalpana[^55]**

*Pishti kalpana* is adopted to the drugs which are fragile to heat. Trituration with the liquid used here provides more potency on therapeutic effect and particle size reduction as well. Trituration with *Gulaba arka* in general in *Pishti Kalpana* enhances the *sheeta guna*. *Pishti* is a unique and accepted preparation in Rasa Shastra as it is prepared without heat. The nature *Pishti* in general is *Soumya* (gentle) and as fine as *Bhasma*.
Table No. 08: Pravala Pishiti Nirmana\textsuperscript{[56], [57], [58], [59], [60]}

| Sl. No. | Bhavana Dravyas          | Procedure                                      | Reference                  |
|--------|--------------------------|------------------------------------------------|----------------------------|
| 1      | Go Dugdha, Gulab arka    | Bhavana of Go Dugdha, 1 gaja puta,             | Rasa Tarangini             |
|        |                          | Bhavana of Gulab arka for 21 days              |                            |
| 2      | Go Dugdha or Gulab arka  | Mardana for 21 days                            | Brihat Rasaraja Sundar     |
| 3      | Gulab arka               | Mardana for 14 days, 8hr./day                  | Ayurveda Sara Sangraha     |
| 4      | Gulab arka               | Mardana for 21 days, 12hr./day                 | Rasa Tantra Sara           |
| 5      | Gulab arka, Keiti arka   | Mardana for several days                       | Ratna Vijnana              |

Table No. 09: Therapeutic effects of Pravala\textsuperscript{[61],[62],[63],[64],[65],[66]}

| Sl. No. | Therapeutic effects                                                                 | Reference                           |
|--------|-------------------------------------------------------------------------------------|-------------------------------------|
| 1      | Deepana, pachana, laghu                                                             | Rasaratna sammuchohay               |
| 2      | Madhura amla rasa, Kapha-pitta-hara, virya-kanthi-kara, stri mangaladayaka, deepana, pachana, laghu, sitala, chakshushya, visaghna | Ratna vijnanam                      |
| 3      | Kshara, madhura, laghu, Sitala, deepana, pachana, balya, tridosha shamaka, visaghna, virya, and varna vardhana | Rasa tarangini                      |
| 4      | Jwaraghna, balya, kanthi vardhaka                                                  | Rasa pradeepika                    |
| 5      | Madhura kinchit-amlarasa, madhura vipaka, kshara guna, Kapha-pitta-nasaka, virya vardhaka, kanti vardhaka | Ananda kanda                        |
| 6      | Virya vardhaka                                                                      | Rasendra sara sangraha             |

Table No. 10: Therapeutic doses of Pravala Bhasma and Pishiti\textsuperscript{[67],[68],[69],[70],[71]}

| Sl.No. | Dose               | References                          |
|--------|--------------------|-------------------------------------|
| 1      | 2 to 6 gunja       | Rasamitra                           |
| 2      | ½ to 2 gunja       | Rasa tarangini                      |
| 3      | 1 – 2 ratti        | Ratna vijnanam                      |
| 4      | 1 – 2 ratti        | Ayurveda Sara Samgraha              |
| 5      | 2 to 6 ratti       | Rasa Tantra Sara and Siddha Yoga Samgraha |
### Table No. 11: Indications of Pravala Bhasma and Pishti[72],[73],[74],[75],[76],[77],[78]

| Sl.No. | Reference            | Indications                                                                 |
|--------|----------------------|------------------------------------------------------------------------------|
| 1.     | Rasa tarangini       | Nettaroga, kshaya, kasa, raktapitta, swedaatigamana, ratrisweda, visa and bhuta vikara |
| 2.     | Rassaratnasamucchaya | Kshaya, raktapitta, kasa, nettaroga, visa and bhutavikara                    |
| 3.     | Rasendrasarasangraha | kshaya, raktapitta, kasa, ratrisweda, nettaroga, bhuta and visa vikara        |
| 4.     | Rasa pradeepika      | Kshaya, raktapitta, kasa, netra roga, visha dosha                             |
| 5.     | Rasamitra            | Kshaya, raktapitta, kasa, netra roga, visa and bhuta vikara                  |
| 6.     | Rasa jalanidhi       | Kshaya, raktapitta, kasa, nettaroga, visa and bhuta vikara                   |
| 7.     | Ratnavignanam        | Kshaya, raktapitta, kasa, visa, bhuta vikara, netra roga and graha dosha      |

### Table No. 12: Formulations of Pravala from Bhaishajya Ratnavali[79]

| Sl. No | Formulation            | Bhasma/Pishti | Indication                        | Reference          |
|--------|------------------------|---------------|-----------------------------------|--------------------|
| 1.     | Badabanala rasa        | Pravala Bhasma| Jwara chikitsa prakarana          | 5/791-794          |
| 2.     | Brihat Kasturi bhairava rasa | Pravala Bhasma | Jwara chikitsa prakarana          | 5/819-826          |
| 3.     | Ratna prabha vati      | Pravala Bhasma| Jwara chikitsa prakarana          | 5/976-978          |
| 4.     | Chudamani rasa         | Pravala Bhasma| Jwara chikitsa prakarana          | 5/981-986          |
| 5.     | Brihat chudamani rasa  | Pravala Bhasma| Jwara chikitsa prakarana          | 5/993-997          |
| 6.     | Bhanu chudamani        | Pravala Bhasma| Jwara chikitsa prakarana          | 5/998-1000         |
| 7.     | Brihat chintamani rasa | Pravala Bhasma| Jwara chikitsa prakarana          | 5/1009-1014        |
| 8.     | Trilokya chintamani rasa | Pravala Bhasma | Jwara chikitsa prakarana          | 5/1114-1117        |
| No. | Name of the Medicine                                      | Author | Description                                 | Pages          |
|-----|---------------------------------------------------------|--------|---------------------------------------------|----------------|
| 9.  | Brihat vishamajwarantaka loha                          | Pravala | Jwara chikitsa prakarana                   | 5/1155-1161    |
| 10. | Apurva malini vasantha rasa                            | Pravala | Jwara chikitsa prakarana                   | 5/1208-1209    |
| 11. | Raktapitta kulakandana rasa                            | Pravala | Raktapittachikitsa Prakarana               | 13/68-71       |
| 12. | Brihat kshayakesari rasa                               | Pravala | Rajayakshma chikitsa prakarana             | 14/91-100      |
| 13. | Kanchanabhra rasa                                      | Pravala | Rajayakshma chikitsa prakarana             | 14/137-142     |
| 14. | Brihat kanchanabhra rasa                               | Pravala | Rajayakshma Chikits aprakarana             | 14/143-148     |
| 15. | Mahamruganka rasa                                      | Pravala | Rajayakshma Chiktsa prakarana              | 14/162-169     |
| 16. | Ratnagarbha pottali rasa                               | Pravala | Rajayakshma Chikits prakarana              | 14/182-187     |
| 17. | Sarvangasundara rasa                                   | Pravala | Rajayakshma chikitsa                       | 14/195-201     |
| 18. | Chudamani rasa                                         | Pravala | Rajayakshma chikitsa Prakarana             | 14/202-205     |
| 19. | Mruganka churna                                         | Pravala | Rajayakshma chikitsa Prakarana             | 14/206-211     |
| 20. | Mukta panchamrita rasa                                 | Pravala | Rajayakshma chikitsa Prakarana             | 14/219-221     |
| 21. | Vasanta tilaka rasa                                     | Pravalapishti | Kasa chikitsa prakarana              | 15/154-156     |
| 22. | Brihat mruganka vatika                                  | Pravala | Hikka, shwasa chikitsa Prakarana           | 16/61-64       |
| 23. | Rasendragutika                                          | Pravala | Swarabheda chikitsa Prakarana              | 17/21-27       |
| 24. | Unmada bhanjana rasa                                   | Pravala | Unmada chikitsa Prakarana                  | 24/41-45       |
| 25. | Brihat vatchintamani rasa                              | Pravala | Vatavyadhi chikitsa                        | 26/145-148     |
|   | Bhasma Prakarana                                      |   |
|---|------------------------------------------------------|---|
| 26| Navaratna rajamruganka rasa Pravala Vatavyadhi chikitsa Prakarana | 148 |
| 27| Pravala panchamrita rasa Bhasma Gulmaroga chikitsa Prakarana | 26/213-218 |
| 28| Vasantatilaka Pravala Prameha chikitsa Prakarana | 32/116-120 |
| 29| Vasanta kusumakara rasa Pravala Prameha chikitsa Prakarana | 37/116-120 |
| 30| Apurva malini vasanta rasa Pravala Prameha chikitsa Prakarana | 37/121-126 |
| 31| Prameha chintamani rasa Bhasma Prameha chikitsa Prakarana | 37/184-186 |
| 32| Mahodadhi rasa Pravala Vrudhiroga Prakarana | 37/187-190 |
| 33| Jyotishman rasa Bhasma Kushta chikitsa prakarana | 32/116-120 |
| 34| Rasendra vati Pravala Mukharoga Prakarana | 37/121-126 |
| 35| Pravaladyanjana Pravala Netraroga Prakarana | 64/140 |
| 36| Muktadi mahanjana Pravala Netraroga Prakarana | 64/213-215 |
| 37| Indushekhara rasa Bhasma Garbhiniroga Prakarana | 68/94-98 |
| 38| Sutikabharana rasa Pravala Sutikaroga Prakarana | 69/112-116 |
| 39| Makaradwaja rasayana Pravala Rasayana Prakarana | 73/75-77 |
| 40| Vasanathakusumakara rasa Pravala Rasayana Prakarana | 73/102-107 |
| 41| Trailokyachintamani rasa Pravala Rasayana prakarana | 73/136-143 |
| No. | Medicine Description                     | Preparation Type | Treatment Type            | Pages       |
|-----|------------------------------------------|------------------|---------------------------|-------------|
| 42  | Srinilakantha rasa                       | Pravala Bhasma   | Rasayana chikitsa Prakarana | 73/144-150  |
| 43  | Makar dwaja vati                         | Pravala pishti   | Vajikarana prakarana      | 74/89-95    |
| 44  | Svarna sindhura rasa                     | Pravala Bhasma   | Snayuroga chikitsa Prakarana | 82/16-19   |
| 45  | Maha Rajatavati                          | Pravala Bhasma   | Snayuroga chikitsa Prakarana | 82/13-15   |
| 46  | Bahumurtantaka rasa                      | Pravala Bhasma   | Bahumutra chiktsa Prakarana | 86/35-38   |
| 47  | Hemanata rasa                            | Pravala Bhasma   | Bahumutra chiktsa Prakarana | 86/43-47   |
| 48  | Vasantakusumakara rasa                   | Pravala Bhasma   | Bahumutra chiktsa Prakarana | 86/48-53   |
| 49  | Kandarpa rasa                            | Pravala Bhasma   | Aupasargika chikitsa Prakarana | 89/27-29  |
| 50  | Ojomehapa rasa                           | Pravala Bhasma/pishti | Ojochikitsa prakarana | 90/22-24   |
| 51  | Kandarpasundara rasa                     | Pravala Bhasma   | Dhvajabhanga chiktsa prakarana | 92/36-43  |
| 52  | Sashi shekhara rasa                      | Pravala Bhasma   | Kloma roga chikitsa Prakarana | 94/13-15  |
| 53  | Surendrabhra vati                        | Pravala Bhasma   | Kloma roga chikitsa Prakarana | 94/16-20  |
| 54  | Brihat bhutabhairava rasa                | Pravala Bhasma   | Yoshapatantraka chikitsa Prakarana | 103/20-25 |
Table No. 13: *Amayika Prayoga* (Therapeutic Usage of *Pravala*)[^80] [^81]

| Sl. No | Disease          | Anupana                                                  |
|-------|------------------|---------------------------------------------------------|
| 1     | Vataja roga      | Madhu + Sharkara + Tulsi Swarasa                        |
| 2     | Pittaja roga     | Sharkara + Dugdha + Madhu + Ardraka swaras            |
| 3     | Nisha sweda      | Madhu                                                   |
| 4     | Asthi bhanga     | Madhu                                                   |
| 5     | Sandhi bhanga    | Madhu                                                   |
| 6     | Daha             | Vamshalochana + Sharkara, Tandulodaka + Madhu + Sharkara |
| 7     | Tivra Daha       | 4 ratti *Pravala* + 1 Masha Aamlaki, Thrice 2-2 hrs.    |
| 8     | Bhrama           | Aamlaki + Ghee + Sharkara                              |
| 9     | Raktarsha        | Pravala Pishti + Nagakeshara + Madhu                   |
| 10    | Raktapitta       | *Pravala* 2 ratti + Swarna Makshika 2 ratti, Thrice     |
| 11    | Pittaja Kasa     | Sharkara + Aadraka swaras                              |
| 12    | Kshayaja Kasa    | Abharaka Bhasma + Vanshalochana + Pravala Bhasma + VasaKwatha |
| 13    | Hikka, Jwara     | Madhu + Pippali                                        |
| 14    | Shotha           | *Pravala* Bhasma 6 Ratti + *Rasa* *Sindoora* 4 Ratti in 4 divided parts, *Punarnava* + *Gokshura Kwatha* |
| 15    | Mootra krichra   | Madhu + Tandulodaka                                    |
| 16    | Mootra Sada      | *Rasa* *Sindoora* + *Gokshura Kwatha*                 |
| 17    | Prameha          | Guduchi Swarasa + Madhu                                |
| 18    | Daha             | Sharkara + Tandulodaka                                 |
| 19    | Pradara          | Dhroushna dugdha, Nagakeshara + Sharkara + Ela + Dugdha |
| 20    | Ati Sweda        | *Pravala* Bhasma + *Yashada Bhasma* 1 – 1 Ratti twice with honey |
| 21    | Dhatu vridhhi    | Ghee + Sharkara                                        |
| 22    | Bala vardhanartha| Aja Dugdha + Sharkara                                  |
| 23    | Virya Sthambhanartha | Vrishya aushadha                                   |
Previous Research Works

Kaushal Arushi et. al. analyzed *pravala moola* and *shakha bhasma* as well as pishti on parameters like a loss on drying, total ash, acid insoluble ash, water-soluble extractive, alcohol soluble extractive, pH, etc. The result showed in table no. 14, that there was no significant difference between *moola* and *shakha* and however the percentage of calcium, phosphorous, iron, magnesium, etc. elements are more in *Pravalamoola* as shown in table no.15.\[82\]

Table No. 14: Physico - Chemical parameters of *Ashodhita, Shodhita, Bhasma, and Pishti* samples of *Pravala Moola* and *Shakha*

| S.No. | Sample | L.O.D. | AV   | AIA | WSE  | ASE  | pH   |
|-------|--------|--------|------|-----|------|------|------|
| 1.    | PM(R)  | 0.49   | 59.37| 1.29| 1.36 | 2.035| 8.8  |
| 2.    | PS(R)  | 0.47   | 57.68| 0.57| 1.58 | 1.641| 9.1  |
| 3.    | PM(S)  | 0.45   | 61.49| 1.31| 2.40 | 1.98 | 9.3  |
| 4.    | PS(S)  | 0.39   | 58.44| 0.71| 1.92 | 1.15 | 9.4  |
| 5.    | PM(B)  | 0.72   | 68.76| 1.43| 9.67 | 4.46 | 10.2 |
| 6.    | PS(B)  | 0.82   | 64.35| 1.28| 6.16 | 4.74 | 10.6 |
| 7.    | PM(P)  | 1.52   | 58.84| 1.91| 3.85 | 6.02 | 9.3  |
| 8.    | PS(P)  | 1.14   | 56.66| 1.83| 4.42 | 8.20 | 9.7  |

*PM – Pravala moola, PS – Pravalashakha, R - Raw, S - Shodita, B - Bhasma, P - Pishti*
Table No 15: Percentage of minerals in I.C.P. Elements of Pravala Moola Bhasma, Pravala Shakha Bhasma, Pravala Moola Pishti and Pravala Shakha Pishti

| Sl. No. | Elements | PM bhasma | P S bhasma | PM pishti | P S pishti |
|--------|----------|------------|------------|-----------|------------|
| 1.     | Ca       | 51.97%     | 45.38%     | 44.60%    | 42.26%     |
| 2.     | Mg       | 3.77%      | 3.59%      | 3.39%     | 3.77%      |
| 3.     | Fe       | 679.1mg/kg | 584.4mg/kg | 688.8mg/kg| 330.3mg/kg |
| 4.     | P        | 159.4mg/kg | 154.8mg/kg | 174.3mg/kg| 93.9mg/kg  |
| 5.     | Si       | 2843.0mg/kg| 1252.9mg/kg| 1584.8mg/kg| 901.3mg/kg |
| 6.     | Na       | 3625.5mg/kg| 3435.5mg/kg| 3516.7mg/kg| 3572.3mg/kg|
| 7.     | K        | 747.0mg/kg | 555.4mg/kg | 253.8mg/kg| 259.6mg/kg |
| 8.     | Mn       | 12.3mg/kg  | 29.3mg/kg  | 11.3mg/kg | 21.6mg/kg  |

Amit Mishra et al. analyzed (XRD, FTIR, SEM, and EDAX) the raw pravala and pravala bhasma. In this study, the FTIR bands appearing in final product spectra showed a significant shift in infrared vibration frequency as well as intensity when compared with the raw material, which was indicative of the formulation of bhasma. The XRD analysis revealed that raw material contained CaCO$_3$ whereas, in the case of the final product of Bhasma, CaO was identified. SEM analysis revealed the difference in particles size of Bhasma (10-15µm) and raw material (100-115µm). The EDAX analysis showed the presence of a different concentration of carbon in both samples.[83]

DISCUSSION

Pravala (Coral) in Ayurveda, is categorized into Sudha Varga (Calcium-rich compounds) and Ratnavarga(Gemstones). From Ratnavarga, apart from its astrological importance it is well highlighted for its therapeutic benefits like pitta shama and asthi poshaka. Medicinal usage of Pravala is not only restricted to Ayurveda but it is having pronounced usage in Siddha and Unani systems of Medicine also.

The historical review also suggests the usage of pravala for ages along. In the past it was used for ornamental purposes later on in the Samhita Period, it came to the field of medicine and afterward, in the classics of Rasashastra, Pravala has been recognized as an important medicine in the treatment of Raktagita, Klaibyata, etc.
In Rasashastra textbooks from Rasa Hridaya Tantra (9th Cent. A.D) to Rasa Tarangini (20th Cent. A.D), the usage of Pravala is well emphasized both in Dhatuvada/Lohavada (Parada Karma: Mercurial processing in the conversion of lower metals into higher metals) and Dehavada (Medicinal preparations). All the textbooks have given a detailed description of Pravala paryaya (synonyms), utpatti, bheda (types), grahya/agraham laxanas (Considerable/Nonconsiderable properties for medicinal preparations), guna karma (Pharmacological and therapeutic properties), shodhana (Purification), Marana (Incineration), pishti kalpana (fine powder), matra (Dose) amayika prayoga (Therapeutic utility) and yogas (Compound formulations) as mentioned above in the tables.

In contemporary science, corals have been zoologically categorized with their habitat/availability from different well-known coral reefs of India. Corals are well characterized by their microscopic and macroscopic characteristics. Physically corals have vitreous/waxy luster, amorphous crystal system, semi translucent to opaque transparency, color ranging from flesh pink, deep rose-red, salmon pink, red to dark blood red, white, orange, black, and grey, and hardness of 3.5 to 4.0. Chemically corals are rich with carbonate of calcium (CaCO₃), magnesium carbonate, silica, and traces of iron and magnesium.

Research work was carried out on the analysis of pravala moola and shakha bhasma, as well as pishti on various Physico-chemical parameters showed that there was no significant difference between moola and shakha however the percentage of calcium, phosphorous, iron, magnesium, etc. elements were more in Pravala moola. Another research work analyzed (XRD, FTIR, SEM, and EDAX) the raw pravala and pravala bhasma. The XRD analysis revealed that raw material contained CaCO₃ whereas, in the case of the final product of bhasma, CaO was identified. SEM analysis revealed the difference in particles size of bhasma (10-15µm) and raw material (100-115µm). The EDAX analysis showed the presence of a different concentration of carbon in both samples.

CONCLUSION

Pravala is a marine originate that is a boon for Ayurvedic therapeutics. Its detailed description is well traced from ancient classical literature to contemporary science. Rasashastra classical textbooks have elaboratively mentioned its identification, pharmaceutical processing, and therapeutic utility. It is clear from the literature review that
Pravala (coral), either bhasma/pishti is a rich source of natural calcium with the evidence of recent research works.

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Dr. Geeta Gadad has conceptualized the manuscript. Dr. Vikram Singh and Dr. Bhumika Sundar drafted the manuscript. Dr. Geeta Gadad has reviewed and revised the manuscript critically.

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