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Conceptual Review of *Pravala* (Coral) – A Marine Source of Natural Calcium



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Geeta G Gadad*1, Vikram Singh², Bhumika Sundar³

1Assistant Professor, Dept. of Rasa shastra and Bhaishajya Kalpana, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidhyalaya Shahapur, Belagavi, Karnataka, India.

2 Final Year P G Scholar, Dept. of Rasa shastra and Bhaishajya Kalpana, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidhyalaya, Shahapur, Belagavi, Karnataka, India.

3 Second Year P G Scholar, Dept. of Rasa shastra and Bhaishajya Kalpana, KAHER'S Shri B M Kankanawadi Ayurveda Mahavidhyalaya, Shahapur, Belagavi, Karnataka, India.

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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).



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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).^[1] 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).^[2]

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.^[3] *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.^[4]

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.^[5]

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.^[6]

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*, *Klaibiyata*, 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 Paddhati* (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 *Abharaka Jarana*, *Abharaka Dravana*, *Rasa Ranjana* and *Khota 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 Vishranti* it is used for *Dharana* purposes and in *Kriyakarana Vishranti* it 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 Ratna* sand 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 *Vishabhutadi 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 *Jaladhigarbha 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	<i>Rasamrita</i>	<i>Ananda kanda</i>	<i>Rasa jalanidhi</i>	<i>Ratna vignana</i>	<i>Rasa tarangini</i>
1	<i>Pravala</i>	+	+	+	+	+
2	<i>Vidruma</i>	+	+	+	+	+
3	<i>Bhoumaratna</i>	+	+	+	+	+
4	<i>Latamani</i>	+	+	+	-	-
5	<i>Ambodhi vallabha</i>	+	-	+	-	-
6	<i>Sagara garbha keeta</i>	+	-	-	-	-
7	<i>Angarakamani</i>	-	+	+	-	-
8	<i>Ambodhi pallava</i>	-	+	-	-	-
9	<i>Raktaanga</i>	-	+	+	-	-
10	<i>Raktaankura</i>	-	+	-	-	-
11	<i>Rakta deha</i>	-	-	+	-	-
12	<i>Jaladhi garbha keeta</i>	-	-	+	-	-
13	<i>Pra abdhi</i>	-	-	-	+	+
14	<i>Jantu valaka</i>	-	-	-	+	-

***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 Shakha*.^[31]



Pravala shaka



Pravala moola

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, vayurvedhya*.

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	<i>Corallium rubrum</i>	

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.

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.^[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.^[40]

Table No. 03: Physical Properties of Corals ^[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	CaCO ₃
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%

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

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

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

Sl. No	Classical reference	Shodhana of Pravala
1	Rasa pradeepika	Bhavana in sahadevi patra swarasa
2	Rasendra Chintamani	Swedana in dolayantra with jayanthi swarasa Swedana in dolayantra using sarjakshara, yavakshara and tankanadrava 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 jayanthi swarasa
4	Rasa Tarangini	Swedana in dolayantra with Jayanti swarasa 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 jayanthi swarasa

Table No. 07: *Marana (Incineration) of Pravala*^{[49],[50],[51],[52],[53],[54]}

SINo.	Reference	Method
1	<i>Ratna Vignanam</i>	<i>Swedana</i> in <i>dolayantra</i> using <i>tanduliya jala</i> for 3hrs <i>swedana</i> in <i>dolayantra</i> for 1 <i>yama</i> with <i>sarja ksharajala</i> . <i>Swedana</i> in <i>dolayantra</i> for 1 <i>yama</i> using <i>jayanthi swarasa</i> .
2	<i>Rasa Tarangini</i>	<i>Pravala</i> is made into a fine powder, ground along with <i>godugdha</i> , made into <i>chakrikas</i> dried, placed in <i>sarava</i> , sealed, dried, and subjected to <i>puta</i> . The same procedure is mentioned by using <i>jayanthi swarasa</i> and <i>shatavari swarasa</i> .
3	<i>Rasa Tarangini</i>	<i>Shodhita pravala</i> is made into a fine powder, grounded along with leaf juice of <i>kanya</i> , made into <i>chakrikas</i> , dried, placed in <i>sarava</i> , sealed, and allowed to dry. It is then subjected to <i>puta</i> for 3 times.
4	<i>Rasendra Chintamnai</i>	<i>Manahsila</i> , <i>Gandhaka</i> , <i>haratala</i> are made into <i>kalka</i> form by adding <i>lakuchaswarsa</i> . It is then applied over <i>Pravala</i> and subjected to <i>puta</i> for 8 times (<i>samanya shodhana</i> of <i>ratnas</i>).
5	<i>Rasendra Sara Sangraha</i>	<i>Pravala</i> is subjected to <i>Bhavana</i> in <i>khalwa yantra</i> with <i>streedugdha</i> , <i>chakrikas</i> are prepared, dried, arranged in <i>sharava</i> , <i>sandhi bandhana</i> is done and cooked over <i>tivragni</i> for 2 <i>prahara</i> to obtain <i>Bhasma</i>
6	<i>Rasa Pradeep</i>	<i>Pravala</i> is heated and dipped in the juice of <i>kumari</i> , <i>tandula jala</i> , <i>stree kshira</i> 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 Pishti Nirmana^{[56], [57], [58], [59], [60]}

Sl. No.	Bhavana Dravyas	Procedure	Reference
1	Go Dugdha, Gulab arka	Bhavana of Go Dugdha, 1 gaja puta, Bhavana of Gulab arka for 21 days	Rasa Tarangini
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, Ketki arka	Mardana for several days	Ratna Vijnana

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

Sl. No.	Therapeutic effects	Reference
1	Deepana, pachana, laghu	Rasaratna sammuchaya
2	Madhura amla rasa, Kapha-pitta-hara, virya-kanthi-kara, stri mangaladayaka, deepana, pachana, laghu, sitala, chakshushya, visaghna	Ratna vignanam
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 Pishti^{[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 vignanam
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.	<i>Rasa tarangini</i>	<i>Netraroga, kshaya, kasa, raktapitta, swedaatigamana, ratri sweda, visa and bhuta vikara</i>
2.	<i>Rasaratnasamucchaya</i>	<i>Kshaya, raktapitta, kasa, netraroga, visa and bhutavikara</i>
3.	<i>Rasendrasarasangraha</i>	<i>kshaya, raktapitta, kasa, ratri sweda, netraroga, bhuta and visa vikara</i>
4.	<i>Rasa pradeepika</i>	<i>kshaya, raktapitta, kasa, netra roga, visha dosha</i>
5.	<i>Rasamitra</i>	<i>kshaya, raktapitta, kasa, netra roga, visa and bhuta vikara</i>
6.	<i>Rasa jalanidhi</i>	<i>kshaya, raktapitta, kasa, netraroga, visa and bhuta vikara</i>
7.	<i>Ratnavignanam</i>	<i>kshaya, raktapitta, kasa, visa, bhuta vikara, netra roga and graha dosha</i>

Table No. 12: Formulations of *Pravala* from *Bhaishajya Ratnavali*⁷⁹

Sl. No	Formulation	<i>Bhasma/ Pishti</i>	Indication	Reference
1.	<i>Badabanala rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/791-794
2.	<i>Brihat Kasturi bhairava rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/819-826
3.	<i>Ratna prabha vati</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/976-978
4.	<i>Chudamani rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/981-986
5.	<i>Brihat chudamani rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/993-997
6.	<i>Bhanu chudamani</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/998-1000
7.	<i>Brihat chintamani rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/1009-1014
8.	<i>Trilokya chintamani rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/1114-1117

9.	<i>Brihat vishamajwarantaka loha</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/1155- 1161
10	<i>Apurva malini vasantha rasa</i>	<i>Pravala Bhasma</i>	<i>Jwara chikitsa prakarana</i>	5/1208- 1209
11	<i>Raktapitta kulakandana rasa</i>	<i>Pravala Bhasma</i>	<i>Raktapittachikitsa Prakarana</i>	13/68-71
12	<i>Brihat kshayakesari rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma chikitsa prakarana</i>	14/91-100
13	<i>Kanchanabhra rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma chikitsa prakarana</i>	14/137- 142
14	<i>Brihat kanchanabhra rasa</i>	<i>Pravala Bhasma</i>	<i>RajayakshmaChikits aprakarana</i>	14/143- 148
15	<i>Mahamruganka rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma Chikitsa prakarana</i>	14/162- 169
16	<i>Ratnagarbha pottali rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma Chikitsa prakarana</i>	14/182- 187
17	<i>Sarvangasundara rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma chikitsa</i>	14/195- 201
18	<i>Chudamani rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma chikitsa Prakarana</i>	14/202- 205
19	<i>Mruganka churna</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma chikitsa Prakarana</i>	14/206- 211
20	<i>Mukta panchamrita rasa</i>	<i>Pravala Bhasma</i>	<i>Rajayakshma chikitsa Prakarana</i>	14/219- 221
21	<i>Vasanta tilaka rasa</i>	<i>Pravalapishti</i>	<i>Kasa chikitsa prakarana</i>	15/154- 156
22	<i>Brihat mruganka vatika</i>	<i>Pravala Bhasma</i>	<i>Hikka, shwasa chikitsa Prakarana</i>	16/61-64
23	<i>Rasendragutika</i>	<i>Pravala Bhasma</i>	<i>Swarabheda chikitsa Prakarana</i>	17/21-27
24	<i>Unmada bhanjana rasa</i>	<i>Pravala Bhasma</i>	<i>Unmada chikitsa Prakarana</i>	24/41-45
25	<i>Brihat vatachintamani rasa</i>	<i>Pravala</i>	<i>Vatavyadhi chikitsa</i>	26/145-

		<i>Bhasma</i>	<i>Prakarana</i>	148
26	<i>Navaratna rajamruganka rasa</i>	<i>Pravala Bhasma</i>	<i>Vatavyadhi chikitsa Prakarana</i>	26/213- 218
27	<i>Pravala panchamrita rasa</i>	<i>Pravala Bhasma</i>	<i>Gulmaroga chikitsa Prakarana</i>	32/116- 120
28	<i>Vasantatilaka</i>	<i>Pravala Bhasma</i>	<i>Prameha chikitsa Prakarana</i>	37/116- 120
29	<i>Vasanta kusumakara rasa</i>	<i>Pravala Bhasma</i>	<i>Prameha chikitsa Prakarana</i>	37/121- 126
30	<i>Apurva malini vasanta rasa</i>	<i>Pravala Bhasma</i>	<i>Prameha chikitsa Prakarana</i>	37/184- 186
31	<i>Prameha chintamani rasa</i>	<i>Pravala Bhasma</i>	<i>Prameha chikitsa Prakarana</i>	37/187- 190
32	<i>Mahodadhi rasa</i>	<i>Pravala Bhasma</i>	<i>Vrudhiroga Prakarana</i>	43/81-83
33	<i>Jyotishman rasa</i>	<i>Pravala Bhasma</i>	<i>Kushta chikitsa prakarana</i>	54/178- 185
34	<i>Rasendra vati</i>	<i>Pravala Bhasma</i>	<i>Mukharoga Prakarana</i>	61/115- 117
35	<i>Pravaladyanjana</i>	<i>Pravala</i>	<i>Netraroga Prakarana</i>	64/140
36	<i>Muktadi mahanjana</i>	<i>Pravala Bhasma</i>	<i>Netraroga Prakarana</i>	64/213- 215
37	<i>Indushekhara rasa</i>	<i>Pravala Bhasma</i>	<i>Garbhiniroga Prakarana</i>	68/94-98
38	<i>Sutikabharana rasa</i>	<i>Pravala Bhasma</i>	<i>Sutikaroga Prakarana</i>	69/112- 116
39	<i>Makaradwaja rasayana</i>	<i>Pravala Bhasma</i>	<i>Rasayana Prakarana</i>	73/75-77
40	<i>Vasanthakusumakara rasa</i>	<i>Pravala Bhasma</i>	<i>Rasayana Prakarana</i>	73/102- 107
41	<i>Trailokyachintamani rasa</i>	<i>Pravala Bhasma</i>	<i>Rasayana prakarana</i>	73/136- 143

42	<i>Srinilakantha rasa</i>	<i>Pravala Bhasma</i>	<i>Rasayana chikitsa Prakarana</i>	73/144- 150
43	<i>Makaradwaja vati</i>	<i>Pravala pishti</i>	<i>Vajikarana prakarana</i>	74/89-95
44	<i>Svarna sindhura rasa</i>	<i>Pravala Bhasma</i>	<i>Snayuroga chikitsa Prakarana</i>	82/16-19
45	<i>Maha Rajatavati</i>	<i>Pravala Bhasma</i>	<i>Snayuroga chikitsa Prakarana</i>	82/13-15
46	<i>Bahumutrantaka rasa</i>	<i>Pravala Bhasma</i>	<i>Bahumutra chikitsa Prakarana</i>	86/35-38
47	<i>Hemanata rasa</i>	<i>Pravala Bhasma</i>	<i>Bahumutra chikitsa Prakarana</i>	86/43-47
48	<i>Vasantakusumakara rasa</i>	<i>Pravala Bhasma</i>	<i>Bahumutra chikitsa Prakarana</i>	86/48-53
49	<i>Kandarpa rasa</i>	<i>Pravala Bhasma</i>	<i>Aupasargika chikitsa Prakarana</i>	89/27-29
50	<i>Ojomehapaha rasa</i>	<i>Pravala Bhasma/pishti</i>	<i>Ojochikitsa prakarana</i>	90/22-24
51	<i>Kandarpasundara rasa</i>	<i>Pravala Bhasma</i>	<i>Dhvajabhanga chikitsa prakarana</i>	92/36-43
52	<i>Sashi shekhara rasa</i>	<i>Pravala Bhasma</i>	<i>Kloma roga chikitsa Prakarana</i>	94/13-15
53	<i>Surendrabhra vati</i>	<i>Pravala Bhasma</i>	<i>Kloma roga chikitsa Prakarana</i>	94/16-20
54	<i>Brihat bhutabhairava rasa</i>	<i>Pravala Bhasma</i>	<i>Yoshapatantraka chikitsa Prakarana</i>	103/20-25

Table No. 13: *Amayika Prayoga (Therapeutic Usage of Pravala)*^{[80], [81]}

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

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 <i>bhasma</i>	P S <i>bhasma</i>	PM <i>pishti</i>	P S <i>pishti</i>
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 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.^[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 therapeutical benefits like *pitta shamaka* 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 *Raktapitta*, *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/agrahya 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 (CaCO_3), 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 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* (10-15 μm) and raw material (100-115 μm). 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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Author contributions

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.

Name of the Institution where the work was primarily carried out:

KAHER'S Shri B M Kankanawadi

Ayurveda Hospital and Research Centre

Shahapur, Belagavi, 590003

Karnataka

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