Abstract

The Shareera depends on Anna and other four factors namely Vata, Pitta, Kapha and Rakta. Rakta is considered as Mula of the Shareera, the external injury or internal injury or due to coagulation disorders there may be bleeding which may lead to morbidity or mortality. In Ayurveda these bleeding disorder is considered as Raktapitta, one of the Mahavega, Mahagada by the Charakacharya. Thus treatment of these bleeding disorder can be done through Sudha Vargeeya Dravya which are rich in Calcium components, in the form of calcium carbonate, calcium sulphate, calcium fluoride etc. Calcium as fourth clotting factor and as cofactor helps in coagulation of the blood. Thus Sudha Vargeeya Dravya by their Parthiva and Shairyata properties does the coagulation of blood and pacifies the Pitta and Rakta Dusthi. Many plant origin, animal origin and mineral origin have been mentioned in various texts of Ayurveda which can act as Calcium supplements and helps in Raktapitta Chikitsa.

Key words: Raktapitta, Bleeding Disorder, Sudha Dravya, Calcium.

Introduction

Rakta Dhatu's main role is Jeevanam,¹ because it is vehicle of Prana. Rakta is one of the Sapta Dhatu, that which nourish and support the body, in modern also Blood is connective tissue in fluid form that delivers necessary substances such as nutrients and oxygen to the cells and transports metabolic waste products away from those same cells. In Ayurveda the metabolism of Rakta occurs through Rasa, here Rasa gets converted into Rakta Dhatu through Rakta Dhatwagni, which is resided in Yakurt and Pleeha (Moolastana of Raktavahastrotas).

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Among the Dashapranayatana - Rakta is one among them because it is considered as Prana which resides in the Raktdhatu and does Jeevana Karma. Sushruta have considered it as the fourth Dosha due to its great importance. As Dosha are responsible for creation of living body, fourth entity named as Rakta Dhatu also take part in origin, sustaining and is responsible for the death², but it is not acceptable as it does not possess the properties of Prakruti Arambhakatva (it is not responsible for Prakruti) Swatantra Dushti Kartrutva (independently it cannot vitiate the body). In Sushruta Shareerasthana it is explained as while circulating it nourishes the respective Dhatus and help in maintaining proper strength i.e. Dhatunapuranam.

Charakacharya explains Raktapitta immediately after Jwara, as it arises due to Santapa caused as a result of Jwara. Sushrutaacharya explained after Pandu Roga due to common causative factors. Raktapitta is an acute (Ashukari) Raktapradoshajavyadhi which is correlated with bleeding disorder, thus it is an important concept which needs immediate treatment.

Samana Guna Dharma of Rakta and Pitta
The Pitta is having Teeksna, Drava, Puti, Neela, Peeta, Ushna, Katurasa but when becomes vitiated Amla Rasa. Rakta has qualities like Anuvushna Sheeta,
Madhura, Snigdha, Guru, Visra and when it becomes vitiated it attains Pitta quality i.e. Anuushnasheeta and Madhura qualities of Rakta becomes Atiushna and Katu respectively. As a result of Ashraya and Ashrayee relationship of Pittadosha and Raktadhatur, Pitta vitiates and combines with Rakta (lohitasamsarga) and contaminates Rakta (pradoshanat). If Rakta Dhatu which has been described as above, flows out of the body through any opening or outlet, it can certainly give rise to serious conditions.

When Rakta and Pitta gets combines, Pitta vitiates Rakta and both attains similar odor and colour. Owing to this relationship, the Vyadhi is addressed as Raktapitta.\(^4\)

In Ayurveda the bleeding disorders are mentioned in the context of Raktapitta, Raktapradara, Raktaatisara, Kshatajakasa etc. Raktapitta is a very complex disease entity due to its bleeding tendency. Raktapradosha (Raktapitta) appears as Lakshana in Kasa, Kshaya and Yakshma etc. and also appears as Upadrava in Jwara and as a separate disease entity as Raktapitta.

But coagulative defects or enzymatic deficiencies or autoimmune type bleeding disorders are not described separately, rather they are mentioned in context of Vidhishonita Adhyaya or Raktapradoshaya Vyadhi. According to Gananathsen; without any Abhigata or Bahyakarana internal causative factor leading to Raktasrasva is known as Raktapitta. As it is Mahagada, Mahavega, Ashukari it should be treated immediately.\(^4\)

Adhistana

Yakrut is the place where Ranjaka Pitta colours Rasa Dhatu and Rakta is formed.\(^5\) It can be interpreted that liquid portion in blood as plasma and the formed elements as Rakta. Spleen is major organ to store platelets which is important for clotting blood and Raktavaha Dhamani ‘Dhamanat Dhamini’ the blood vessels which are pulsating one, helps to transport the blood. Due to excessive Ushnata of Pitta there may be breaking of these vessels, leading to bleeding disorders. Another entity of Raktavahasrotas is Raktadhara Kala which can be interpreted with the epithelial membrane of the blood vessel and capillaries. The role Kala in the physiology and pathological is haemostasis and nourishment.

In physiology the Rasa, Rakta and Raktavahasrotas plays an important function. Their role is to proper formation, maintaining the hoemostasis, proper metabolism including formation, maturation, transport, their destruction and also proper elimination or transformation of by products of these Dhatus.

Raktapitta Nidana

Nidana of Raktapitta are quiet similar to that of general Nidana which can provoke Pitta Dosha and numerous Viruddhaaharasevana are mentioned. As far as Viruddhaahara are concerned they are quiet specifically mentioned in only two chapter other than Raktapitta i.e. in Vidhishonitha and Kushta.

Samprapti

The interpretation of the Samprapti can be done as ‘Pittat Peeta Sitam Raktam Styayatya Oushnya Chirena Cha’\[^6\]

- Pitta Prakopa does Dushana of Raktadhatur through its Ushnateeksnaguna.
- Due to Pitta Prokapa Rakta gets Vidhagnda and attains Dravatwa, which can be compared with inability or loss of clotting factors.
- Liquified Rakta and Pitta mixed one another and attains Tulyaroopavarna and Pramanatavridddhi
- Due to Pramanatavrddhi of Rakta there is delayed coagulation due to thinning of blood which leads to Raktapitta / bleeding disorders.
**Raktapitta Gati**

According to Gati of Rakta it is of three types

- **Urdhavaga - Snigdha** and **Ushna Guna** involvement with **Kapha** and **Pitta** vitiation e.g.; haematomesis, epistaxis, retinal haemorrhage etc.

- **Adhoga** - the attributes are **Rooksha** and **Ushna** which causes vitiation of **Vata** and **Pitta** e.g.; rectal bleeding, haematuria, menorrhagia, metrorrhagia.

- Apart from this, **Asankhyeya (Antiki) Gati** has been described in the Charak Samhita, Chikitsasthana 4; in which **Doshas** also get expelled through the **Loma Koopa** (the openings of the sweat glands/skin pores). This condition should be considered as life threatening. This condition can be compared with subcutaneous haemorrhage (like Purpura, Petechial) described in Modern medicine.

**Modern View**

Bleeding disorders or haemorrhagic diatheses are a group of disorders characterised by defective haemostasis with abnormal bleeding. The causes of haemorrhagic diatheses may or may not be related to platelet abnormalities.

Other causes are;

- Due to vascular abnormalities
- Due to disorders of coagulation factors
- Combination of all these.

**Coagulation Disorders**

The type of bleeding in coagulation disorders is different from that seen in vascular and platelet abnormalities. Largeecchymoses, haematomas and bleeding into muscles, joints, body cavities, git and urinary tract. Coagulation disorders are both acquired and hereditary.

**Hereditary coagulation disorder**

- Are due to qualitative or quantitative defect in a single coagulation factor.

- Two most common inherited coagulation disorders are x linked disorder i.e. haemophilia A (due to deficiency of factor 7) and haemophilia B or Christmas disease (deficiency of factor 9).

- Von willebrand ’s disease.

**Acquired coagulation disorder**

- Deficiencies of multiple coagulation factor
- Vitamin k deficiency
- Coagulation disorder in liver diseases
- Fibrinolytic defect and Disseminated intravascular coagulation

**Haemophilia A**

Clinical findings;

- Bleeding for hours or days after the injury.
- It can involve any organ but commonly haemoarthosises, muscle haematoma and haematuria.

Lab findings;

- Whole blood coagulation is prolonged
- Prothrombin time is usually normal
- APTT is typically prolonged

**Haemophilia B**

- Inherited deficiency of factor 9.
- It is rarer than haemophilia A.

**Von willebrand ’s disease**

- Defeciency of von willebrand ’s factor
- 1 in 1000 people individuals of either sex
- VWF complex comprises of large fraction of factor 8 –vw factor
- Main function of vwf is to facilitate the adhesion of platelets to subendothelial collagen.

**Vitamin K deficiency**

Plays important role in haemostasis since it serves as a cofactor in the formation of 6 prothrombin complex proteins.
Coagulation disorder in liver disease

Synthesis and metabolism of coagulating factors gets disturbed.

Haemostasis\(^8\)

Coagulation of blood – when blood is shed out or collected in a container it loses its fluidity and becomes jelly like mass after few seconds.

Stages of haemostasis
1. Vaso constriction
2. Platelet plug formation
3. Coagulation of blood

Among all these factors calcium as a fourth factor plays important role coagulation. In Ayurveda *Sudhavarga Dravyas* are mentioned which are rich in calcium ions, and used in *Raktapitta Chikitsa*.

Calcium is essential for protein conformation of most coagulation factor,

Source: Bone and absorption from food in gastrointestinal tract,

Pathway: Both extrinsic and intrinsic,

Action: Works with many clotting factors for activation of the other clotting factors. These are called calcium-dependent steps. Factor ninth and thirteenth gets activated by calcium ions.

Role of calcium in blood coagulation
- Platelet adhesion
- Protein conformation
- Protease complex assembly
- Enzyme activation
- Normal hemostasis requires free ionized ca for initial platelet plug formation

Low level of coagulation factor 4\(^{th}\) calcium
- A congenital deficiency of factor 4
- Low level of calcium in blood due dietary deficiency
- Malabsorption from gut

Kidney malfunction
- Bone disorder

Blood Calcium
- Present in Plasma about 9-11mg
- It is present as 41% non-ionized and bond to protein, not diffusible through capillary membrane and is not filtered by glomeruli and 9% is combined with anionic substances like citrate and phosphate, is diffusible through capillary membrane and glomeruli 50% is both ionized and diffusible through capillary membrane.

*Sudha Vargiya Dravya*

*Sudha* means - nectar, honey, comfort, water, milk, good drink, beverage of gods etc. In Charaka and Sushruta *Samhita Sudha* (lime) has been included in *Parthiva Dravya*. Both *Rasaratnakara* and *Rasarnava* mentioned *Shukla Varga*.\(^9\) *Rasamritam* mentioned *Sudhavigyanem* based on its chemical composition. *Sudhavargiya Dravya* has chief compound Calcium in the form of calcium carbonate, calcium fluoride, calcium sulphate.

<table>
<thead>
<tr>
<th>S N</th>
<th>Name</th>
<th>Common Name</th>
<th>Origin</th>
<th>Chemical Constituents</th>
<th>Form</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Sudha</td>
<td>Lime</td>
<td>Mineral</td>
<td>CaO</td>
<td>Oxide</td>
</tr>
<tr>
<td>2</td>
<td>Khatika</td>
<td>Chalk</td>
<td>Mineral</td>
<td>CaCO3</td>
<td>Carbonate</td>
</tr>
<tr>
<td>3</td>
<td>Godanti</td>
<td>Gypsum</td>
<td>Mineral</td>
<td>CaSO4.2H2O</td>
<td>Sulphate</td>
</tr>
<tr>
<td>4</td>
<td>Shankha</td>
<td>Conch shell</td>
<td>Marine</td>
<td>CaCO3</td>
<td>Carbonate</td>
</tr>
<tr>
<td>5</td>
<td>Shambuka</td>
<td>Australian</td>
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<td>Carbonate</td>
</tr>
<tr>
<td>6</td>
<td>Muktashuki</td>
<td>Pearl oyster</td>
<td>Marine</td>
<td>CaCO3</td>
<td>Carbonate</td>
</tr>
</tbody>
</table>
CaCO3 is the alkaline based it requires extra stomach acid for better absorption. So best taken after meals. One difference between the various Ca compounds in the percentage of elemental compound present. In CaCO3 form, Ca accounts for 40% of the compound, while Ca citrate form provide 24% elemental calcium. Calcium in cereals and green leafy vegetables are less utilized due to the presence of oxalates and phytates present in them respectively. Calcium compounds are alkaline in nature. The natural calcium preparations like Bhasmas are more effective than synthetic due to the reason that, they contain easily absorbable and assimilable form of oxide and they contain other trace elements such as magnesium, copper, zinc etc. Irrespective of the gastrointestinal condition they do exhibit their efficacyunlike synthetic molecules which cannot be expected with synthetic molecules.

Shodhana of Sudha Dravya

One of the purification method of Sudhavarga Dravya is by Amla Vargadravya. As all these are calcium compound and may contain physical impurities and has alkaline nature. The Amla Dravyas are acidic in nature and hence removes the excess alkaline nature of Ca compounds. Thus to make smoother and palatable form the Shodhana is necessary.

<table>
<thead>
<tr>
<th>Animal source</th>
<th>Mineral source</th>
<th>Plant source</th>
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<tbody>
<tr>
<td>Kapardika</td>
<td>Godanti</td>
<td>Vamsalochana</td>
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<tr>
<td>Shankha</td>
<td>Badarashma</td>
<td>Vasa</td>
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<tr>
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<td>Khatika</td>
<td>Nagakesara</td>
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<tr>
<td>Mrigashringa</td>
<td>Dugdhapashana</td>
<td>Arjuna</td>
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<tr>
<td>Kukkutandatwak</td>
<td>Churnaka</td>
<td>Plaksha</td>
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<tr>
<td>Samudraphena</td>
<td>Kousheyashma</td>
<td>Aja dughda</td>
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<td>Ajasthi</td>
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<td>Bilwa etc.</td>
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<tr>
<td>Pravala</td>
<td>Moutika</td>
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<tr>
<td>Hastidanta</td>
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</tr>
</tbody>
</table>

Samanya Chikitsa in Raktapitta

According to Avastha treatment is done by Shodhana, Shamana and Sthambana. Here Shodhana is done when there is Pitta and Raktadooshana, Stambana is done when there is Jeevarakta and Shaman is preferred if Ksheenabalamamsa condition. We can apply Chikitsa as follows.

1. Tikta Rasa Prayoga
   - Bhoutika: Vayu and Akasha
   - Guna: Ruksha, Sheeta, Laghu.
   - Kleda, Meda, Vasa, Majja, Shakta, Mutra Shoshana.
   - Kusta, Murcha, Jwara, Utklesha, Daha, Pitta and Kaphahara.

2. Stambana Dravya Prayoga

3. Sharad Rutu Paripalana
Why Sudhavargiya Dravya in Raktapitta?

These Sudhavargiya Dravya has additional advantage in Bhasma form and therapeutic actions such as,

- Correcting indigestion
- Properties like antacid
- Ulcer healing
- Anti-colic properties which cannot be expected with synthetic molecules.
- The absorbability of calcium compound in Bhasma form is better.

These Sudhadrayya are Parthiva in nature and has qualities like Guru, Kathina, Vishada, Manda, Sandra, Sthula, Sthir, Gandha Guna Bahulya. And has functions like Upachaya (nourishment), Sanghata (provides hardness and compactness), Sthairyat (provides stability) and Gouravata. All these qualities play important role in coagulation of blood. Thus by applying Guna Siddhanta by Parthiva Guna Bbahulya and Sthairyata property of Sudha Dravya the Saratva, Dravatwa, Ushnatva Guna of Raktapitta can be pacified.

Churna, Nyagrodadhi Ghra Prayoga can be done).

- Vasa Patrakalka with Madhu - has Tikta and Kashayarasa, Sheeta Virya enchance the liver protective enzymes (superoxidase and catalase) and also used in antihaemorrhagic drug.
- Madhuka, Sharkinga, Lodra, Sariva with Ajaksheera Sadhitha.
- Manjista, Sariva, Lodra, Padmaka, Utpala with Ajaksheera Sadhitha.
- Ikshukanda Prayoga - Swarasa kept overnight, in next morning Utpala and Madhu is added - Ikshu contains calcium oxalate, Vatapittanashaka.
- Kashaya prepared with Jambu, Amra, Arjuna.
- Udumaraphala Rasa Prayoga.
- In severe Raktapitta - Madhu with Kamala Bhasma.
- Matulunga Yoga - Matulunga Mula and Pushpa Kalka is made and mixed with Tandulodaka. Matulunga contains calcium oxalate, haemostatic in nature.

Nasagata Raktapitta

- Avapida Nasya
- Nilotpala, Gairika, Shankha, Chandana, Sita and Jala.
- Nasya with Amrashtiras, Samanga, Dhataki, Mocha Rasa and Lodra.

Mutra Marga Raktapitta

- Siddha Gritha prepared with Gokshura, Shatavari, Shalaparni, Prsnaparni, Mudgoparni, Mashaparni.
- Shatavari Ksheera - Shatavari + Gokshura Kwath + Kalka prepared with Ksheera.

Vit Marga Raktapitta

- Mocha Rasa Siddha Dugdha - Mocha Rasa in one among Shonita Stopana Dravya.
- Godugdha, Mocha Rasa Kalka, Sugandhabala, Nilotpala, Shunisadhitla Dugdha.
Some of the formulations are *Chandrakalaras*\(^{[10]}\) acts on *Raktavahini*, when *Rakta* vitiated by *Pitta*. Extremely useful in all types of *Raktapitta*, being pacifier of *Ushna*, *Teekshna Guna* acts as *Dahashamak*. Recommended for persons with *Pitta* *Prakruti*, especially in *Greeshma* and *Sharad Rhutu* for maintenance of health. *Anupana* - *Vasa Swarasa*, *Durva Swarasa*, *Kushmanda*, *Amalaki*.

*Bola Bhaddharas*\(^{[11]}\) an effective *Rakta Sthambhak Khalvi Rasayana* with main ingredient 'Raktabola' (calcium rich) useful in *Adhoga Raktapitta*, especially *Yonigata Raktapitta*, helps in controlling excessive bleeding in *Atyartava* and *Raktaprada*, it tones up the uterine muscles. Acts as *Vranaropaka* in healing the cervical erosion and ulcers in vagina *Anupana* - *Vasa Swarasa*.


**CONCLUSION**

The mineral origins like *Shankha Bhasma*, *Pravala Bhasma*, *Khatika*, *Mukta Shukti Bhasma*, *Kukkutanda Twak Bhasma* etc. and some of the plants and animal origin which contains calcium as the component should be applied in different forms of *Raktapitta* condition. Others plants having calcium are; *Asvatha*, *Upodika*, *Palakya*, *Talavruskha*, *Kembuka*, *Hastikarni*, *Rajgira*, *Surana*, *Erandakarkati* etc. Calcium compounds used in Ayurveda which are grouped under *Sudhavarga* not only restricted to bleeding disorders but also applied in *Amlapitta*, *Grahani*, *Parinamashula*, *Swasa*, *Kasa*, *Hrudrada* etc. thus without using synthetic form of calcium, using in *Bhasma* form surely will gain therapeutic importance in clinical practise. Thus *Sudha Vargeeya Dravya* plays an important role in bleeding and coagulation disorders.

**REFERENCES**


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