

**RAKTASRAVA AND RAKTA STAMBHANA - SUSHRUTA'S CONCEPT ON
HAEMORRHAGE AND HAEMOSTASIS AND IT'S MODERN DAY RELAVANCE**

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ABSTRACT

Ayurveda is the science of life that is based on the basic concepts of *Dosha*, *dhatu* and *mala*. *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja*, and *Shukra* are the seven *Dhatus* that make up a human constitution. In terms of modern science, *Rakta Dhatu* is comparable to blood, yet the texts show that the idea of *Rakta Dhatu* is considerably more expansive than that of blood. In trauma units, operating rooms, and intensive care units, doctors routinely face haemorrhage, a common medical emergency. Significant intravascular volume loss may trigger a chain of events that leads to hemodynamic instability, decreased tissue perfusion, cellular hypoxia, organ damage and death. Numerous sophisticated novel haemostatic techniques, procedures, and medications are uncovered by contemporary science but *Ayurveda's* principles and practices have stood the test of time by providing unfathomably profound insights of its ancient mystics, particularly *Sushruta Samhita*, that have numerous references that demonstrate the effective therapy of emergency and life-threatening conditions, including haemorrhage. In *Ayurveda* the relevance and specificity of the classics of *Acharya Sushruta* listed four fundamental haemostatic techniques *Skandana*, *Sandhana*, *Pachana* and *Dahana* which will be evaluated proving the relevance in present era.

KEYWORD: Haemorrhage, *Ayurveda*, *Sushruta*, *Dosha*, *dhatu*, *mala*, *Rakta*.**INTRODUCTION**

The word "*Rakta*" is derived from *Sanskrit* word "*Ras Ranjane*" which indicates Red colour. *Rakta dhatus* have alternatives names such as *Rudhira*, *Asrik*, *Shonit*, *Kshataj*, *Lohit* and *asru*.^[1] *Rakta* is a *Matrija Bhava*. *Rakta* contributes to the formation of various organs of *Matrija Bhava's* like: *Yakrit*, *Pleeha*, *Phuppusa*, *Unduka*, *Antra*, *Guda*, *Basti*, *Jihwa*, *Vrikka* and *Hridaya*.^[2-3] *Sushruta* said that *Rakta Dhatu* is base of living body. *Jivana*, which refers to the manifestation and maintenance of life force, is the term used to define the primary function of *Rakta dhatu*. The *prana vayu*, which circulates with blood, gives all living cells life. *Shonita Kshaya* produces roughness of skin, craving or desire for sour and cold things, flabby veins (emptiness of blood vessels).^[4] If there is loss of *Rakta Dhatu* due to any reason, there will be *Kshaya* (decrease) of all other *Dhatu* and vitiation of *Vata*.^[5]

A haemorrhage is an abrupt blood loss caused by a broken blood vessel. Minor bleeding can occur when the skin's superficial blood vessels are harmed, which can result in petechiae and ecchymosis. Additionally, it can be serious, resulting in a variety of symptoms like changes in vital signs and altered mental status. Both

internal and external haemorrhage are possible. External bleeding can be caused by some trauma or from natural orifice. To rule out internal bleeding high levels of clinical suspicion established through a comprehensive history, physical examination, laboratory tests, imaging, and attentive observation of vital signs is must. Arresting the haemorrhage and increasing the amount of blood that is circulating are the primary objectives of resuscitation. This article reviews the evaluation and management of haemorrhage w.r.t *sushruta* and highlights its role and efficacy in present day.

Blood and its importance

देहस्य रुधिरं मूलं रुधिरेणैव धार्यते । तस्माद्यत्नेन संरक्ष्यं
रक्तं जीव इति स्थितिः ॥ [सु. सू 14/44]

Blood sustains life and maintains vitality. Blood is life. Hence it should be preserved with the greatest care. *Vata*, *Pitta* & *Kapha* are the cause of origin of body and maintains the body like, a house supported on three pillars (*Tristhuna*). When vitiated they brings about destruction. Likewise, *Shonita* the fourth *Dosha* is also present during origin, existence & destruction of body.^[6]

[सु. सू 21/3]

Outcomes of Haemorrhage

धातुक्षयात् सुते रक्ते मन्दः सञ्जायतेऽनलः । पवनश्च परं कोपं याति तस्मात् प्रयत्नतः ॥[सू. सू14/37]

Excessive blood loss leads to *kshaya* of *dhatu*s (impaired physiology of body tissues) reduced appetite and an agitated condition of the *Vayu* (*Vaat*) owing to the loss of the fundamental principles of the body and a state of disequilibrium. *Vata* vitiation decreases *rakta dhatu* which again reduces the red blood cells count. The cold and rough properties of *vata* reduces *rakta dhatu*s ability of providing warmth and life to body. This results in weak and fatigued body.

Clinical features of Haemorrhage

अतिप्रवृत्ते | तदतिप्रवृत्तं

शिरोऽभितापमान्ध्यमधिमन्थतिमिरप्रादुर्भावं

धातुक्षयमाक्षेपकं पक्षाघातमेकाङ्गविकारं तृष्णादाहौ हिक्कां कासं श्वासं पाण्डुरोगं मरणं चापादयति ॥ [सू.सू 30/14]

Clinical features of acute haemorrhage have been clearly mentioned in *sushruta samhita sutra sthana* chapter fourteen *Shonitavarnaniyamadhyayama* (importance of blood & related descriptions). The ancient Ayurveda scholars were also aware about complications of heavy bleeding and most of them are similar to as in modern medical science. Headache, blindness, *Adhimantha* (a disease of the eye), *Timira* (partial blindness), depletion or loss of tissues, convulsions, paralysis, burning sensation, hemiplegia, hiccup, dyspnea, cough, anemia, unconsciousness, dizziness, loss of hearing and death are described as complication of heavy bleeding.

Shirobhitapa / Headache (heating up of head), Aandhyam / blindness along with other ocular features like adhimantha (severe pain in eyes or glaucoma) and timira (cataract) – Bleeding in the brain resulting in increased pressure, decreased blood flow, hypoxia, severe headache, tissue death. The stress response triggered by blood loss may lead to such symptom and overexertion.

Dhatu kashya / body tissues – *Rakta* is a *dhatu* that supports the body. Its depletion would further lead to inability to provide adequate nutrition and oxygen to the body. Cognitive decline, attention disorders, emotional instability, uncoordinated motor work, visual, hearing to Generalised weakness. All of this is the consequence of the depreciation of blood flow and decreased oxygen carrying capacity.

Aakshepaka / Seizures - Haemorrhage in brain can place high pressure on the brain resulting in damage. Normal blood flow can be disrupted causing oxygen deprivation and neuronal death and these ischemic changes precipitate seizures.

Ekanga vikaar / Paralysis and Pakshaghat / hemiplegia –The ultimate result of haemorrhage leading to ischemic

cascade initiated by blood loss is neuronal death along with an irreversible loss of neuronal function and finally loss of function or neurological symptoms.

Trishana / Thirst – Haemorrhage decreases blood and interstitial fluid volume activating components of the endocrine and autonomic nervous systems in a manner that involves the generation of behaviours associated with the acquisition and ingestion of fluids.

Daha / Burning sensation – With blood loss, the body often "clamps down" on blood vessels in the limbs to re-direct blood to important organs. The loss of oxygen to the limbs can cause tingling or burning in the hands or feet.

Hikka / Hiccups, Kasa / Cough, Shwasa / Asthma dyspnoea– Low blood volume means low circulating body fluid which means reduced oxygen carrying capacity and acidosis.

Pandu / Anaemia– If there is massive bleeding, body may lose enough blood to cause acute and severe anaemia. Also chronic anaemia is also reflected by pallor of skin.

Haemostasis

The natural haemostatic system of the body is able to manage the mild to moderate bleedings. It comprises of three successive stages: vasoconstriction, platelet plug formation, and blood coagulation.^[7]

Coagulation is the process by which blood changes its state from liquid to gel. It potentially results in haemostasis, the cessation of blood loss from a damaged vessel, followed by repair. There are three essential steps in blood coagulation: 1) A complex cascade of chemical reaction occurs in the blood involving more than a dozen blood coagulation factors in response to rupture of the vessels or damage to blood itself. As a result, the formation of a complex of activated substances takes place which collectively called as prothrombin activator. 2) The prothrombin activator catalyses conversion of prothrombin in to thrombin. 3) The clot is formed when thrombin acts as an enzyme to convert fibrinogen into fibrin fibres that enmesh platelets, blood cells, and plasma.^[8]

Acharya Sushruta had explained about the management of HAEMORRHAGE in detail which can be described in following way.

Diet - In case of haemorrhage due to the weak digestive power, food should be light (easily digested), not very cold, which promote blood formation. The food must be taken along with milk and *Yusha* (soup of grains) with excess quantity of *ghee* or oil. The decoction of *Kakolyadigana* added with sugar and honey should be given to drink in case of haemorrhage.

Blood ingestion -Ayurveda believes in the principle of *samnaya and vishesa*. Therefore, if there is *rakta kashya* or blood loss we must simply replace it with blood. In critical case of haemorrhage, the whole blood of deer, antelope, camel, rabbit, buffalo or boar could be given to drink. It was the original concept of Acharya *Sushruta* with minimum complications considering the resources available at that time and risk assessment, which later established as blood transfusion.

Also various accounts of blood taken in other forms rather than ingestion is available including *rakta basti* (enema) in diseases like *pandu or raktaj* diseases like *yonigrog* and many researches have proven its efficacy in multiple scenarios for e.g. iron deficiency anaemia, thalassemia with many more yet to come.

Shiravedhana- The bleeding vein should be counter cut once again near the cut area which had been cut accidentally or therapeutically. ■

Ancient Indian surgeon *Acharya Sushruta* also described several haemostasis techniques, including *Sandhana, Skandana, Pachana, and Dahana*. The first line of treatment for haemorrhage during surgery is *Skandana*, followed by *Sandhana*. If bleeding is still not under control, *Pachana* and *Dahana Karma* should be utilised, or these techniques should be used in accordance with the type of bleeding.

Raktasrava Nirodha Karma (Methods of management of haemorrhage)

The management to prevent the haemorrhage can be concluded in four types of methods as follows

- *Skandanam* (thickening or congealing the local blood)
- *Sandhanam* (process by contracting the affected part)
- *Pachanam* (process of digestion in the wound or chemical cauterisation)
- *Dahanam* (process of heat cauterisation)

a. **Skandana**- It means clotting or coagulation of blood^[9] with the help of *Hima Dravya* (ice-cold things). It promotes clotting by the use of Cold drugs or materials. At first this method should be used. Cooling measures such as, applications of ice or cold packs etc., tend to increase blood viscosity and vasoconstriction.

Sheetal upchar (Cold therapies)- Cold poultices should be administered to bleeding wounds, and a moist cloth should be placed over the patient's wound or body or cold liquid can be poured. Patient should be kept in cold environment.

b. **Sandhana**- It literally means uniting.^[10] In this context joining the edges of the wound is called as *sandhana*. The astringent drugs are used for this purpose. If the bleeding cannot stop by *skandana karma*, then this method should be done. Drugs of astringent tastes are

possessed of the property of bringing about an adhesion (contraction) of the wound.^[11] Techniques for tying, bandaging, and suturing have been mentioned and used to halt bleeding; its ties enable skin to be held back in place, which speeds up the onset of hemostasis by platelets. When administered internally, astringent medications may cause mucous membrane or tissue to shrink and are frequently used to control internal bleeding or mucous secretions. For e.g.

- **Lodhradichurna** -In case of haemorrhage powder of *Lodhra (Symplocos racemosa)*, *Madhuka (Glycyrrhiza glabra)*, *Priyangu (Callicarpa macrophylla)*, *Gairika (Fe₂O₃)*, *Sarjarasa (Shorea robusta)*, *Rasanjana (extract of Berberis aristata)*, *Salmalipuspa (Salmalia malabarica)*, *Shankha (conch shell)*, *Shukti (oyster shell)*, *Masha, Yava(barley)* and *Godhuma(wheat)* to be used on wound in powdered form.
- **Saladichurna**- Powder of bark of *Sala (Shorea robusta)*, *Arjuna (Terminalia arjuna)*, *Arimeda (Acacia fernasiana)*, *Meshashringi (Gymnema sylvestre)*, *Dhava (Anogeissus latifolia)* and *Dhanvana (Grewia tiliaefolia)* or ash of *Kshauma (flax)* or powder of *Samudraphena(cuttle fish bone)* and *Laksha(resin produced by Laccifer lacca)* should be sprinkled on the wound.

Almost all mentioned plants have been utilized to control bleeding in traditional and folk medicines in different parts of the world. The haemostatic activity of plant extracts is mainly attributed to several mechanisms, including coagulation stimulation via increasing the factor XII activity and plasma fibrinogen levels, the fibrinolysis inhibition, vascular or smooth muscle constriction and platelet aggregation. It is propounded that the bioactive compounds which are often involved in the bleeding control are categorized as tannins, saponins, glycosides and other phenolics.

c. **Pachana**- It means ripening or digestive measures^[12] by using the *Bhasmas* (burned ash powder) to achieve haemostasis. The drugs which adheres the wound by their coagulation effect are used in this method like ash or alkali materials. It might be regarded as a caustic material depending on the preparation because the ashes, which were recovered after distillation, are primarily of an alkaline character. By virtue of its ability to increase blood coagulation, the *Ksharas* on external application can breakdown local tissue protein when applied topically or by dusting. In condition of failure of *Sandhana karma* it should be done. Alkalis and alkaline preparations produce liquefactive necrosis by denaturation of proteins and saponification of fats in such a wound or ulcer.

d. **Dahana**- It means Burning combustion, heat cauterizing and cautery.^[13] This is considered to be superior to above mentioned three procedures, if

haemostasis is not achieved *Agnikarma* is the definitive option in controlling the bleeding.^[14] Applying Direct heat externally can coagulate and constricts the veins. Thus, provide the hemostasis. This is the best method for hemostasis which should be done in case of failure of above three methods. This process is done by electric cautery in modern medical science.

DISCUSSION

The *Skandhana* procedure's mode of action can be described as a vasoconstriction, altering viscosity and decreasing metabolic needs. In general, it can be applied to systemic internal haemorrhages, tropical haemorrhages, and capillary haemorrhages. Blood clotting, contraction, wound approximation is helped by the *Sandhana* technique. Additionally, the medications mentioned in *Vranaropaka* that are intended to stimulate wound healing should be examined from the standpoint of haemostasis because the first step of wound healing involves blood clotting. Similar to this, the *Pachana* technique uses *Bhasma* and *Kshara* to coagulate and breakdown tissue protein, which leads to homeostasis. *Bhasmas* and *Kshara* might be viewed in this perspective as ashes with moderate alkali properties; as a result, they are beneficial in reducing the haemorrhage by chemical cauterisation. In the last stage, *Dahana* implies coagulation-causing cauterization hence, Haemostasis and tissue protein damage (heat cauterisation) will be accomplished.

CONCLUSION

Haemorrhage, often poses a threat to life if not treated promptly and efficiently. Haemorrhage control is therefore of utmost significance. There are several different haemostasis techniques being developed in the current state of medical knowledge. However, the treatments outlined in the Ancient Indian Sciences especially by *Acharya Sushruta* are uncomplicated and less invasive while still being more efficient and posing fewer risks. These techniques are also extremely cost-effective when employed in remote locations with limited resources. The ancient wisdom in this traditional system of medicine is still not exhaustively explored. The junction of the rich knowledge from different traditional systems of medicine can lead to new avenues in herbal drug discovery process. The lack of the understanding of the differences and similarities between the theoretical doctrines of these systems is the major hurdle towards their convergence apart from the other impediments in the discovery of plant-based medicines. This review aims to bring into limelight the age-old history and the basic principles of Ayurveda. This would help the budding scholars, researchers and practitioners gain deeper perspicuity of traditional systems of medicine, facilitate strengthening of the commonalities and overcome the challenges towards their global acceptance and harmonization.

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