

EXPLORATION OF KALA SHARIRA W. S. R. TO EFFECTS OF SARPAVISHA ON RAKTADHARA KALA

Tushar Suresh Waghmare¹, Kalpana R. Chavhan²

¹P.G. Scholar, Dept. of Agadtantra & Vyavhar Ayurved, GAC, Nagpur, Maharashtra, India

²Assistant Professor, Dept. of Agadtantra & Vyavhar Ayurved, GAC, Nagpur, Maharashtra, India

Email: waghmaretushar84@gmail.com

ABSTRACT

Kala is a unique part explained by *Acharya Sushruta* in *Garbhavyakaran Sharira Adhyaya* of *Sushruta Samhita*. *Kala* are defined as membranous structures which separate *Dhatu* and *Ashaya*. There are seven *kala* explained by *Acharya Sushruta* as, *Mamsadhara*, *Raktadhara*, *Medodhara*, *Shleshmadhara*, *Purishdhara*, *Pittadhara* and *Shukradhara Kala*. In *Kalpasthan* of *Sushruta Samhita*, *Acharya* has explained about the *Visha*. In *Sarpadashtra Visha Vigyaniya Adhyaya* he has put forth the concept of *Visha Vegantar* which means transmission of *visha* from one *dhatu* to another *dhatu* through *kala* and according to different *kala* different *Visha Lakshana* i.e. symptoms are explained. Amongst *saptakala* second *kala* is *Raktadhara Kala* which is deeply embedded in *Mamsa dhatu* i.e. muscle tissues. The specific site of this *kala* is *Siras Yakruta* and *Pleeha*. When *Sarpavisha* enters the *Raktadhara Kala*, some kind of anatomical and physiological changes occurs at the level of structures associated with it. Hence the attempt was made to explore *Kala Sharira* and compile effects of *Sarpavisha* on *Raktadhara Kala*.

Keywords: *Raktadhara Kala*, *Sarpavisha*, *Kala*, Liver, *Visha lakshana*

INTRODUCTION

Kala is a unique part explained by *Acharya Sushruta* in *Garbhavyakaran Sharira Adhyaya* of *Sushruta Samhita*. *Kala* is defined as 'Dhatvashyantara Maryada' i.e. membranous structure which separates or limits *Dhatu*s and *Ashaya*s.^[1] There are seven *kala* explained by *Acharya Sushruta* as, *Mamsadhara*, *Raktadhara*, *Medodhara*, *Shleshmadhara*, *Purishdhara*, *Pittadhara* and *Shukradhara Kala*. As *kala* limits *dhatu*s and *ashaya*s they allow them to function properly.

Amongst *Saptakala* 2nd *kala* is *Raktadhara kala*. *Raktadhara kala* is deeply embedded in *Mamsa Dhatu* i.e.

muscle tissues. The specific site of this *kala* is *Siras, Yakrut* and *Pleeha*.^[2] Through *Raktadhara kala* blood circulation is carried out.

In *kalpasthan*, *Acharya* has explained about *Visha* i.e. Poison their symptoms, treatment and prognosis according to the manifested symptoms. In *Sarpadashtra Vishavigyaniya Adhyaya* he has described about various types of snakes, their habitat, poisonous symptoms and other systemic effects on human body. He has also explained about the concept of *visha vega* and *visha vegantar* i.e. transmission of poison from one *dhatu* to another through *kala* and according to differ-

ent *kala* different *Visha lakshanas* i.e. toxic symptoms are explained.^[3]

Acharya Sushruta has mentioned *Rakta* as *Jiva*^[4] i.e. life, as *damshtra visha* enters directly to the *Rakta* and vitiates *Raktadhara kala* and some Anatomical and Physiological changes occurs at the level of structures associated with it.

Aim

To explore *Kala Sharira* and effect of *Sarpavisha* on *Raktadhara Kala*.

Objectives

- To explore *Raktadhara kala*.
- To explain various effects of *Sarpavisha* on *Raktadhara Kala*.
- To study Anatomical and Physiological changes occurring at the structures associated with *Raktadhara Kala*.

Material and Methods

Sushruta Samhita and other *samhitas* from *Bruhat-trayee* and *Laghutrayee* along with their commentaries by different Authors were referred for the study. While studying about *Kala* through *Sushrut Sharir*

Sthan the commentaries of different authors and some texts were critically studied to interpret and conclude about *Kala*. The matter available on internet and published journals were also studied. References from modern sciences were also utilized to correlate the concepts.

Sthana Nishchiti

According to *Acharya Sushruta*, *Raktadhara kala* is deeply embedded in *Mamsa Dhatu* i.e. muscle tissues. The specific site of this *kala* is *Siras*, *Yakrut* and *Pleeha*.^[5]

Yakruta and *Pleeha* are completely made up of *Rakta*.^[6] Also these two are stated as the origin of *Raktavaha Srotas*^[7] i.e. Circulatory system.

Correlation-

- *Yakruta* – Liver
- *Pleeha* – Spleen
- *Siras* – Blood Vessels

Observations

When different type of snake venoms are injected to the animals like Rats and Monkeys various kind of Histopathological changes are seen as –

1. Changes at Liver :

Cobra	Viper
<ul style="list-style-type: none"> ▪ 203 gene expressions are altered.^[8] ▪ Deleterious alteration of hepatic tissues.^[9] ▪ Liver injury.^[10] ▪ Cytoplasmic granulation of hepatocytes^[11] ▪ Swelling of the Hepatocytes ▪ Disturbed cell permeability^[12] ▪ Decreased in Na⁺/K⁺ ATPase Activities. ▪ Cell Death.^[13] ▪ Rupture of Hepatic cell membranes.^[14] ▪ Inflammatory cellular infiltration (ICI) around hepatic veins. ▪ Prominent van kupffer cells^[15] <p>(Van Kupffer cells reside within the lumen of the liver sinusoids and are constantly exposed to gut-derived bacteria, microbial debris and bacterial endotoxins, hence known to activate macrophages.)</p>	<ul style="list-style-type: none"> ▪ Hepatic necrosis. ▪ Mitochondrial damage.^[16] ▪ Fibrin deposition. ▪ Ischemia.^[17] ▪ Hepatic damage.^[18] ▪ Vascular damage. ▪ Presence of lympho-histocyte element in the liver. ▪ Hemosiderin increases.^[19] ▪ Congestion of blood vessel. ▪ Hydropic degeneration (Swelling) of hepatocytes^[20]
<p>Common changes found in both the Species</p> <ul style="list-style-type: none"> ▪ Degeneration of collagen IV. ▪ Destruction of basement membrane. 	

- Breakdown of capillary vessels.
- Leakage of blood components.
- Inflammation or impairment of Hepatocyte function.^{[21], [22]}

2. Changes in Blood Vessels^{[23], [24]} :

- Congestion of blood vessels.
- Loss of collagen fibers.
- Damaged blood vessels.
- Disappearance of the collagen fibers at basement membrane of endothelial cell of blood vessels.
- Leakage of blood components from blood vessels.
- Rupture of walls of vessels.
- Formation of thrombus completely/ partially blocking lumen of vessel.
- Necrotic changes in vessel wall.

3. Changes in Blood^[24] :

- Presence of Polymorphonuclear Leucocytes.
- Extra vasculated Erythrocytes were swollen and spherical.

Post mortem changes^[24]:

❖ Liver :

- Liver is not found usual.
- Several small petechial haemorrhages are seen along anterior border of liver.

❖ Spleen :

- Spleen found usually small.
- Firm and slate grey in colour.
- The cut surface was red and dry, a very little blood could be scrapped from the surface.

DISCUSSION

Kala is a unique concept explained by *Acharya Sushruta* in *Sushrut Samhita Sharira Sthan*. We also find references of *kala* in *Ashtanga Sangraha*, *Ashtanga Hridaya* and *Sharangdhara Samhita*. All *Acharyas* has explained seven *kala*. In 4th chapter of *Sushrut Samhita Kalpasthan*, *Acharya* has explained about *visha vega* and *visha vegantar* which means transmission of *visha* through *kala*. According to seven *kala*, seven *vega* are explained. Each *vega* shows specific *lakshanas* i.e. symptoms.

When snake bites, the venom directly enters the blood stream and starts circulating in whole body along with blood. Also according to *Acharya Charak*, *visha*

firstly affects *rakta dhatu* which further affects *siras*, *yakrut* and *pleeha*. As *yakrut* and *pleeha* are origin of *raktavaha srotas* they get affected quickly. According to *Acharya Sushruta*, *yakrut* and *pleeha* are completely made up of *Rakta dhatu*. Hence they get vitiated easily. Changes occur in liver, spleen and blood vessels which lead to death of the person.

To prevent the further damage to the tissues and organs and death of the patients, *Acharya Sushrut* has stated the treatment according to the *visha vegas* so that the *visha* doesn't spread further in the body and become fatal to the life. Amongst all the treatment modalities told by *Acharya Sushrut* and *Acharya Charak*, both have told to firstly treat *Rakta Dhatu* by means of *Arishtabandhan*, *Utkartan*, *Nishpidan*, *Chushan*, *Raktapkarshan*. Different kind of *agad* are also been told for treatment purpose in order to save patients life^{[26],[27],[28]}

CONCLUSION

- Snake venom enters the blood stream and starts damaging blood vessels, altering blood components, affects the structure and function of spleen (phagocytosis), it also damages liver and hamper its normal function.
- It eventually leads to the blockage of blood vessels, ischemia, alteration of cell permeability, rupture of vessels and leakage of blood components. This will lead to hampering the function of organs which would finally lead to death of the person.
- Getting into the consideration of importance of *Rakta* and *Raktadhara kala*, *Acharyas* has specifically emphasized on the treatment modalities related to the *raktadhata* which prevents further spread of the *visha* and vitiation of *Raktadhara Kala* which ultimately leads to saving of patient's life.

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