

EFFECT OF COVID 19 ON RAKTADHARA KALA

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ABSTRACT

Severe pulmonary disease caused by the novel coronavirus (severe acute respiratory syndrome coronavirus 2) has devastated many countries around the world. Major symptoms of Covid-19 are fever, cough and dyspnea. Its minor symptoms are alteration of smell and taste, gastrointestinal symptoms, bleeding disorders, headache and cutaneous manifestation. Dysfunction of liver and spleen as a complication of covid 19 is found in some patients that leads to the predisposing factor for severe covid 19. Liver damage is rather common in covid 19 patients and is most likely multifactorial, caused by the direct contact of SARS CoV to the liver by the use of hepatotoxic drugs or as a consequence of hypoxia. When we go through the concepts of *Ayurveda*, *Raktadhara kala* is said to be the second prime *kala*. It is situated in a *mamsa* and holds the *Rakta* present in *sira*, *yakrut* and *pleeha*. It can be correlated with the endothelial lining of blood vessels. Endothelial cells release substances that control vascular relaxation, contraction as well as enzymes that control blood clotting, immune function and platelet adhesion. The inner layer of all blood vessels, lungs, liver and spleen is made up of these endothelial lining cells. The *sthana* of *rakthadhara-kala* is *yakrut* and *pleeha* as per *Ayurveda* and the symptoms of severe covid 19 are also noticed in these organs. So, hereby evaluating the effects of covid 19 on *raktadhara kala*.

Keywords: *Raktadhara kala*, *Sira*, *Yakrut*, *Pleeha*, Covid 19

INTRODUCTION

Acharya Sushruta mentioned the concept of *kala* in *Garbhvyakaran sharir* of *sharir sthan* along with detailed development of body parts. *Kala* is the limiting membrane between the *Dhatu* and *Aashya*¹. *Raktadhara kala* is the second prime *kala*. It is situated in *mamsa* and holds the *Rakta* present in *sira*, *yakrut* and *pleeha*². *Kala* is 7 in number³. They provide support and protection to the internal body organs. *Kala* is a structure in the form of a membrane that separates the hollow or lumen of an organ from its lining tissue. Among 7 *kalas*, *raktadhara kala* is said to be the second prime *kala* in the body. It is situated in *mamsadhara kala* (the membrane that holds muscle tissue) and holds the *Rakta* present in *sira*, *yakrut* (liver), *pleeha* (Spleen). Therefore, the major role of *raktadhara kala* is to support *rakta* and help in its circulation throughout the body. *Kala* as per *Ayurveda* performs vital functions of the body and any deformity or malfunction will lead to pathology. The *dosha* is the moving across the body in their normal as well as in abnormal form but wherever they get suitable environment they get stuck to a respective body part and results in the formation of diseases. If this principle is applied in the case of *kala*, then we can say that *kala* can also be a sight of pathology. If *kala* deviates from its normal function, then it will lead to some diseases. A certain group of diseases are transmitted from one person to another by direct or indirect contact. Another group of diseases is born from a common source of polluted water, air, land and or disturbed climate which refers to the broad heading of “*Janapadadhwansa*” *janapada* means community, *dhwansa* means perishing or destruction⁴. Coronavirus disease, covid 19 which is zoonotic in origin and mostly spread through respiratory droplets, has caused a big threat to mankind. The blood in the body, circulate in a closed circuit through arteries, capillaries and veins with the help of the heart. Covid 19 causes systemic disease with possible involvement of kidney, heart, blood vessels, liver, spleen and lungs causing severe damage to these organs and blood vessels leading to thrombosis⁵. Same is seen in the case of *raktadhara kala* which hold *rakta* present in *sira*, *yakrut* and *pleeha*. *Yakrut*, *Pleeha*

and *Raktavahi dhamni* are also considered as *moola sthana* of *raktavaha srotas*⁶. So, these organs also help in maintaining the quality of *rakta* by producing heparin, clotting factors, vitamin k etc which are synthesized in the *yakrut*, which have the main role in controlling the qualities of *rakta*. *Raktadhara kala* can be correlated to the endothelial lining of the blood vessels which is made up of simple squamous epithelium.

Modern science has explained different types of blood vessels which includes artery, vein, capillary, arteriole & venules. Anatomically there is 3 distinct layer that forms a wall of blood vessels. These are tunica externa, Tunica media, Tunica intima⁷. Tunica intima is the innermost layer and is made up of a single layer of endothelial cells. The endothelium is the thin layer of flattened cells that lines the inner surface of the entire cardiovascular system. It merges with an inner lining of endothelium of the blood vessels. Endothelium layer, Sub-endothelial layer, basement membrane collectively form tunica intima. In the case of the liver and spleen, a special type of structure called Sinusoids is present in the large amount. The Wall of these Sinusoids also consist of endothelial cells & it is a prime layer that holds the blood under circulation. From the above mentioned, we can say that blood is in direct contact tunica intima & Sinusoids of the liver & spleen.

Covid -19 infection while travelling through the blood seems to attack this endothelial layer. *Raktadhara kala* mentioned in *Ayurveda* has great similarity with that of endothelial lining of blood vessels. Therefore, to fight against blood-related complications of covid 19, we can use preventive and curative methods for protecting vitiated *raktadhara kala*.

AIM AND OBJECTIVES:

- To the study of *Raktadhara kala* and its *sthana*.
- To study Covid 19 infection.
- To find out the effect of covid 19 on *raktadhara kala*

MATERIAL & METHODS:

- Classical texts of *Ayurveda*, journals, articles, internet material and previous research papers.
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DISCUSSION

Kala means "Dhatu - Ashayantar Maryaadah". *Kala* separates the *Dhatu* & the *Ashaya*. *Ashaya* is the cavity that holds *Dosha*, *Dhatu* & *Mala*. *Sushruta* elaborates the characteristic feature of *Raktadhara kala*, when there is an injury to the cactus (*Snuhi*) tree then some milk-like secretion will come out⁸. Similarly, the blood oozes out immediately from the *mamsa* when it is injured. Considering the above reference this *raktadhara kala* can be compared with the endothelial lining of the blood vessels.

Raktadhara kala is a membranous limitation between *Rakta dhatu* & *Ashaya*. According to *acharya Sushruta*, the *viddha lakshana* of *Raktavaha Srotas* are *shyavangata* (darkening of the skin) cyanosis, *pandu* (pallor skin) and these are the symptoms of mild to moderate haemorrhagic shock also. But he has not described *viddha lakshana* of *Raktadhara kala*. Due to *ashray ashrayi sambandha* between *Raktavaha Srotas* and *Raktadhara kala*,⁹ we can see these symptoms in *raktadhara kala* disruption also. *Raktadhara kala* helps in the formation and transmission of blood. Traumatological injuries and communicable diseases can damage *Raktadhara kala*. In viral infections such as AIDS, Dengue, thrombosis is common. Hypercoagulability is also seen in severe cases of covid 19 where there is the involvement of liver, spleen and blood vessels are found¹⁰. These three are also the prime places of *raktadhara kala*. So, we can say that there is vitiation of *raktadhara kala* in severe cases of covid 19.

CONCLUSION

Raktadhara kala is correlated with endothelial lining present in Tunica intima & Sinusoids of the liver & spleen. The presence of sinusoids may be a reason that the liver & spleen are also a place of *raktadhara kala*. Structurally the walls of sinusoids consist of nothing but endothelial cells and it is a prime layer that holds the blood under circulation so it may be considered as *raktadhara kala*. Endothelial cells are responsible for maintaining vasomotor tone, Haemostasis, Thrombosis, inflammatory process, Platelet & leucocytes

vessel wall interaction & controlling vascular permeability. If the endothelium is injured, it results in vascular damage.

In our opinion, *Raktadhara kala* and the endothelial lining of blood vessels, sinusoids of the liver and spleen are structurally same. So, *Raktadhara kala* can be considered as one of the sites for the treatment of severe coagulation related complications of covid-19.

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