Critical Analysis of role of Ranjak Pitta and Raktagni in Perspective of Modern Physiology

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Abstract: Pitta dosh is one of the fundamental entities mentioned in Ayurveda. Ranjak pitta is one of the types. Ranjak name of pitta itself suggests its role. Rasasya ranjant is it’s function mentioned in compendia. It means coloring of rasa dhatu and converting it into raktadhatu which is of red color. All Acharyas Charak, Sushrut, Vagbhat, Sharangdhar all have mentioned the same function of this pitta. In spite of this, there is some discrimination related to the site of this Pitta. Charak and Sushrut have mentioned the site of this in Yakrit, Pleeha and Vagbhat has mentioned it in Amashay. Sushrut has mentioned this Ranjak Pitta as Ranjakagni. In the context of Agni, total 13 types of Agni are mentioned which includes Raktagni. Raktagni is responsible for formation of Rakta and the role of Ranjakagani is colouring of ahara rasa. To know if these are same or different, the present review is made and with the overview of modern physiology it can be concluded that agni and pitta have Ashray and Ashrayi relation. The discrimination relates to different sites of Ranjak Pitta and can be justified according to modern physiology. Ranjak Pitta mentioned by Vagbhat can correlate with the factor secreted by gastric glands which is called intrinsic factor of castle and Ranjak Pitta mentioned by Charak and Sushrut is extrinsic factor which is stored in Yakrit and participated in process of erythropoiesis. These intrinsic and extrinsic factors are equally important for RBCs formation which carries out the function of Rasasya Ranjana. Raktagni is responsible for formation of Rakta Dhatu from Ahararasa and Ranjak Pitta or Ranjakagni is partially part of Raktagni.

Keywords: Ranjak Pitta, Rasasya Ranjan, Ranjakagni, Raktagni, Intrinsic factor, Extrinsic factor.
1. INTRODUCTION

Pitta is the concept mentioned in Ayurveda as an entity in the body which is responsible for conversion of one form into another. The term Pitta is derived from the root “Tap Dahe”, “Tap Santape”, “Tap Aishwarya”. “Tap” means to heat. Dahe which leads to dahan i.e. burning, Santape to heat and Ashwarya refers to the factor which facilitates for best achievement. The significance of action of pitta is reflected as the functions of Agni. Sushrut has mentioned as pitta and agni to be the same. He has mentioned all pittas in terms as Agni. Ranjak pitta as Ranjagni, Bhrajak pitta as Bhrajagni. It creates controversy in interpretation of concept of pitta and agni. Then in the view of Pitta’s actions as dahan (burning, oxidation, combustion), pachan (digestion), transformation which are mentioned in the context of functions of pitta; these functions are not possible without Agni. So Sushruta himself gave the statement as pitta is antaragni. Pitta performs the functions of Pitta as Pachan, maintenance of body temperature, Darshan, Kshudha, Trishna, taste, complexion, understanding capacity, intelligence, courage, Softness of body which are not possible without the presence of Agni. 1 Our aim of study is to critically analyse Ranjak pitta and of Raktagni in the context of Ayurved and Modern Physiology. Our objective is to Study the role of Ranjak Pitta and Raktagni in perspective of Ayurved Physiology, to interpret its role in perspective of Modern Physiology and to correlate the role of Ranjak pitta and Rakta Dhatwagni.

2. MATERIALS AND METHODS

All the literature from Classical texts of Ayurveda viz. Charaka Samhita, Sushruta Samhita, Ashtanga Sangrah and Ashtanga Hridaya were reviewed. Modern Physiology books were referred for review of modern perspective. The information of research databases from various search engines, journals, Ayurvedic samhita, books were referred for recent information. Critical analysis of available literature was also done.

2.1 OBSERVATIONS

From the point of view of Ayurveda, Pitta has been described as Agni (fire) since it performs fire-like actions i.e. Paka, which refers to Pachana (Digestion); Dahana (Burning) including Bhinna Samghata (splitting), Tapan (Heat production) Parinama (Conversion), Paravritti (Transformation) Praakshana (Illumination), Ranjana or Varnakara (Colouration) and Prabhakara (to cause luster) 4, 5. In a general sense, the term Kaya or body itself has been equated to Agni. Total thirteen types of agni are mentioned. Kayagni, Dhatwagni and Panchamahabhutagni. Agni and Pitta both have similar functions but are not the same 11. They have relations as Ashray and Ashrayi. Agni is the active component residing in Pitta. When pittaperform the function of pachan or tapan or dahan; it is performed by the active entity – agni which resides in it. 26-27 Ranjak Pitta is designated by Sushruta as Ranjakagni4. According to Sushruta and Charak the site of Ranjak pitta is Yakrit and Pleeha4, 5. Both Vagbh has mentioned the site of Ranjak pitta is Amashaya. According to Sharangadhar, liver is also the site of Ranjak Pitta. In function he has stated the function of Ranjak Agni is to give color to the Rasa dhatu. It means Rasa dhatu gets converted into Raktadhatu by action of Rajakagni i.e. Ranjak Pitta present in Yakrit and pleeha. This Raktadhatu formation means coloring of rasa dhatu. The root site of Raktavahasrotas is also Yakrit and pleeha4. The formation of Rakta dhatu is the work of Raktagni. Coloring of rasa dhatu is the function performed by Ranjak pitta or Ranjakagni.

3. DISCUSSION

The term “Blood” comprises the Rasa dhatu and Raka dhatu. Blood Plasma relates to Rasa dhatu and blood cells relates to Raka dhatu. The rasa dhatu gets color and rakta dhatu forms; this conversion is not only related to coloring of dhatu. Rakta dhatu has the composition of three cells viz. Red Blood Cells, White Blood Cells and platelets. The color of the blood is basically because of the presence of red blood cells. When we review the modern physiology this concept is confirmed. According to modern science the factor secreted in the stomach has correlation with the factor present in Yakrit and responsible for coloration of rasa dhatu that means RBCs formation. The site of Ranjak pitta mentioned by acharya Vagbh is Amashaya. It means this ranjak pitta

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can correlate with the factor secreted by gastric glands which is called intrinsic factor of castle. Intrinsic factor of a castle is produced in gastric mucosa by the parietal cells of the gastric glands. It is essential for the absorption of vitamin $B_12$ from the intestine. This vitamin $B_12$ is called extrinsic factor. In the absence of intrinsic factors, vitamin $B_12$ is not absorbed from the intestine. That leads to pernicious anemia. It’s very interesting to note that both Acharyas Sushrut and Vagbhata have stated that formation of Rakta is Yakrit or liver and pleeha or spleen. Sthan is the word in reference to either formation of rakta or reservoir or it or both. Sthan word also implies storage depot or the place of production or both. The sthan of rakta dhatu is Yakrit and pleeha is fully appreciated by this and also supported by modern physiology. According to modern physiology the process of formation of blood cells i.e. hemopoiesis occurs in Liver, Spleen and Bone marrow. In fetal life, the erythropoiesis occurs in three stages as Mesoblastic Stage, Hepatic Stage and Myeloid Stage. Mesoblastic stage is for the first two months of intrauterine life; in this stage, the RBCs are produced from mesenchyme of yolk sac. Hepatic stage is from the third month of intrauterine life. It lasts up to the 6th month. In this stage the liver is the main organ that produces RBCs. Spleen and lymphoid organs are also involved in erythropoiesis. Third period of the intrauterine period is the third trimester. During this period, the RBCs are produced from red bone marrow and liver. After birth up to the age of 5 to 6 years this process occurs in liver and red bone marrow of long bones. After 6 years, it shifted to red bone marrow of long bones. As age progresses the bone marrow of shafts of long bones get converted into yellow bone marrow by deposition of fatty tissues. After the age of 20 years the RBCs are produced from membranous bones like vertebræ, sternum, ribs, scapula, iliac bones and skull bones and from the ends of long bones. After 20 years of age, the shaft of the long bones becomes yellow bone marrow because of fat deposition and loses the erythropoietic function. In adults if bone marrow gets destroyed the function of erythropoiesis takes place in liver and spleen. This overview supports the fact that the liver and spleen are the root sites of raktavahasrotas. The process of haemopoiesis also emphasized that after the age of 20 years, it is shifted to bone marrow in particular to the end points of long bones and bone marrow of flat bones. In Ayurveda there is no direct reference to the Site of Raktadhatus of Majja i.e. bone marrow. However in Sushrut Samhita Saraktamedait is mentioned in small bones. Sushruta has mentioned that majja is present inside the shulasandhis. The substance present in sukshmas and his is spoken as Sarakta meda. By implication, the majja which is present in stools which saraktamedas and of anausthi is saraktamedas. This saraktameda can be correlated with Red bone marrow. Charak has also mentioned that the filling of bones by meda is calledmajja. According to Sushrut, this majja is responsible for the strength of the body, fills the internal cavities of bone and provides strength to the body. It contributes to the formation of Shukra which is saptamadhatus. No work related to hemopoiesis is mentioned by any Acharyas. This majja composition is mentioned as Shuddha sneha. Kaviraj Gananath Sen opined that majja is of two kinds, viz. pitta and rakta. Pitta is found in nalashasthi, while rakta is found in other bones. Process of dhatu formation showed that at root sites of srotas, respective dhautagni will act on it and with the help of all ingredients available in ahar prasadansh the respective dhatu will form and at the same time dhatu mala will also form. This process can be interpreted with the help of modern physiology. Erythropoiesis is the process of generation and maturation of Red Blood Cells. During this process of generation of RBCs, haemoglobin starts to appear in the cells in the intermediate normoblast stage. This haemoglobin is responsible for the red color of the blood. This process is supported by Ranjakagni or Ranjak pitta. This erythropoiesis is one part of haemopoiesis. Haemopoiesis also includes leucopoiesis and thrombopoiesis. It includes the process of generation of all cells. This is the function of Rakta dhautagni. The factors essential for hematopoiesis as erythropoietin and thyroxine hormones are essential to prepare cells by using haemopoietic growth factors and vitamins B, C, D & E. These erythropoietin and thyroxine hormones can be correlated as Raktagnino. It helps to carry out the process & helps for generation of blood cells which is qualitatively & quantitatively Raktaghantu. In reference to Ranjak pitta, Sushrut has mentioned the site as Yakrit and pleeha. On the other hand Vagbhata have been mentioned as Amashaya. The role of Ranjak Pitta is only coloration of Rasa dhatu. It means it is limited to RBCs which have the role of hemoglobin. On the other hand, the factors responsible for the formation of RBCs like Vitamin B12 and Folic acid which are required for the maturation of RBCs are mostly stored in the liver. Vitamin B12 is called an extrinsic factor since it is obtained mostly from diet. The Vitamin B12 & folic acid are required for maturation of RBCs. This process supported that the root site of raktavaha srotas is Yakrit and pleeha which are mentioned by Sushrut. Total raktaghantu formation is the work of Raktagnino which includes the process of haemopoiesis that means formation of RBCs, WBCs and platelets also. Coloring of rasa dhatu means it relates to formation of RBCs only that is the process of erythropoiesis. This role is performed by Ranjakagni or Ranjakagni. The Rakta dhatu must comprise of all the three cells as it has the main function of Jeevan. This is provided by all the three cells. RBCs deal with the function of carrying oxygen with the help of hemoglobin. WBCs relate with the function of immunity. Platelets have the role in haemostasis. In this way all the cells have the main role to protect & provide life.

4. CONCLUSION

It can be concluded that the rajak pitta is labeled as rajakagni by Sushrut. The role of this Ranjakagni is one part of Raktagnino. Both relate to the function of formation of Rakta dhatu. Sushrut has mentioned sthan of Ranjakagni or ranjaka pitta and Raktagnino in Yakrit and Pleeha. Vagbhata has mentioned the site of ranjaka pitta is Amashaya. Both acharyas’ opinions are correct and justified by modern physiology. Sthan word implies storage depot or the place of production or both. Function of ranjakagni i.e. ranjak pitta is related to RBCs formation and Raktagnino is related to all cell formation.

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6. CONFLICTS OF INTEREST

Conflict of interest declared none.
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