Review Article

Hemolytic Jaundice – An Ayurvedic Perspective

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Abstract

Background/Purpose –

To understand the concept of Hemolytic Jaundice in Ayurveda.

Method –

Jaundice is the yellowish discolouration of the skin, mucous membrane and sclera due to an increased level of Bilirubin in the blood. Various pathological substrates may result in Jaundice, one of which is due to Hemolysis. Hemolytic Jaundice is also known as Pre hepatic Jaundice. Here, there is an increase in the level of Bilirubin with a decrease in Red Blood Cell count.

Pandu Roga is *Pitta Pradhana Rasa Pradoshaja Vyadhi*. If *Dushta Pitta* deranges the factors responsible for the biotransformation of *Rasa* to *Rakta*, it leads to the non-production of *Rakta Poshaka Sara Bhaga*. Also, if there is destruction of formed *Rakta Poshaka Rasa*, depletion of *Rakta Dhatu* occurs.

In *Pittaja Pandu*, vitiation of *Rakta* takes place and if *Pitta Pradhana Pandu Rogi* indulges in *Pitta Prakopaka Nidana*, further vitiation of *Pitta Dosha* occurs affecting neighbouring *Srotas* i.e., *Raktavaha Srotas* and thereby *Rakta Dhatu*. Thus, *Pandu Roga* acts as *Utpadaka Hetu* for *Koshtashakhashrita Kamala*.

Result -

Pittaja Pandu acts as a *Nidanarthakara Roga* for *Koshtashakhashrita Kamala*, a condition analogous to Hemolytic Jaundice.

Conclusion -

Therefore, Hemolytic Anemia is viewed as a latent form of jaundice, while Clinical Jaundice represents the overt manifestation of Hemolytic Jaundice.

Keywords – Rakta, Pandu, Koshtashakhashrita Kamala, Hemolytic Jaundice

Introduction:

Dosha, Dhatu and *Mala* are responsible for the maintenance of the structural and functional integrity of the body. *Rakta* is one among *Sapta Dhatu*. *Rakta* is produced from *Rasa* at *Yakrut* and *Pleeha* by the influence of *Rakta Dhatwagni*. The main function of *Rakta* is *Jeevana Karma*.[(1)] *Pitta* and *Rakta* have *Ashraya-Ashrayi Sambhanda* i.e., when *Ashraya* decreases, *Ashrayi* also decreases.[(2)]

Although *Pandu Roga*, as well as *Kamala*, are two different diseases, they are dealt within the same chapter in most of the Samhitas. The possible reasons could be, both diseases are raised by the *Pitta Dosha*, affecting the *Rakta Dhatu* directly or indirectly resulting in *Rasa Rakta Kshaya* in the due course of the illness, having the common clinical identity i.e., the abnormal colours of skin and mucus membrane (*Varnena Upalakshita Vyadhi*) and *Pandu Roga* acting as *Nidanarthakara Roga* for *Kamala*. Acharya Dalhana considered *Panduroga* to be of eight types and referred *Kamala* as *Panduroga Bheda*.[(3)]

Kamala Roga is primarily classified into two, based on the discolouration of the skin and the mucous membrane *(Varnena Upalakshita Vyadhi*) - as a diagnostic criterion: *Koshtashakhashrita* and *Shakhashrita Kamala* are two types of *Kamala* with different pathology. Although the term *Koshtashakhashrita* and *Shakhashrita* look like the pathological term, it refers to the presence or absence of *Mala Ranjaka Pitta* at *Koshta*. Hence, this classification is based on the colour of the *Malaranjaka Pitta* i.e., yellow. The presence of *Pitta* at *Shakha* is denoted by the yellowish pigmentation of the skin and mucous membrane. The absence of *Malaranjaka Pitta* at *Koshta* results in a sticky, clay-coloured stool which is considered as *Shakhashrita Kamala* and in its presence, the stool colour will be yellow which is called as *Koshtashakhashrita Kamala*.

Kamala is also classified into *Bahupitta Kamala* and *Alpa Pitta Kamala*. This description is partially based on the *Samprapti*. *Pitta Pradhana Nidana* aggravates *Pitta Dosha* in the body thereby vitiate the *Rakta Dhatu* resulting in the development of *Koshtashakhashrita Kamala*. As *Dushta Pitta Dosha* drives the illness, *Koshtashakhashrita Kamala* is called as *Bahupitta Kamala*. Whereas in *Shakhashrita Kamala, Kapha Vata* provoking *Nidana* vitiates *Kapha Vata*

Dosha which in turn obstructs the normal *Gati* of *Mala Ranjaka Pitta* resulting in *Shakhashrita Kamala*. While clinical signs of *Pitta Dushta Lakshana*, such as yellowish discolouration, are evident, it is the influence of *Kapha Vata Dosha* that displaces the usual *Pitta Dosha*, leading to what is termed as *Alpa Pitta Kamala*. *Shakhashrita Kamala* is also referred as *Rudhapatha Kamala* as *Kaphavata* obstructs the normal *Gati* of *Mala Ranjaka Pitta*.

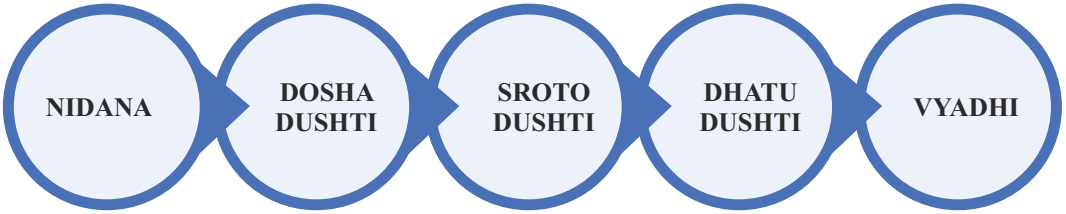
Kamala is developed as the result of the progression of *Pitta Pradhana Vyadhi* such as *Pandu* and other *Pitta Pradhana Vyadhi*.[4] *Pandu* is mainly *Pitta Pradhana Rasa Pradoshaja Vyadhi* and may also be due to *Rakta Dushti* by *Pitta* alone without the involvement of *Rasa*.[5] *Panduroga* is *Santarpanotta Vikara* and at times it is also caused by *Apatarpana*.[6,7] *Pandu Roga* is caused due to different *Nidana* and at times caused by *Nidanarthakara Roga* as well as *Abhighata* to the *Raktavaha Srotas*.[8]

Materials And Methods:

This article material is collected from various Ayurveda and modern textbooks.

Rasa Pradoshaja Vikara:

It includes *Asraddha, Aruchi, Asyavairasya, Arasagyata, Hrillasa, Gaurava, Tandra, Angamarda, Jwara, Tamah, Pandu, Srotorodha, Klaibya, Angasada, Krushangata, Agninasa, Vali* and *Palitya*.[9] Due to *Nidana*, vitiation of *Dosha* takes place leading to vitiation of a respective *Srotas*, thus respective *Dhatu Dushti* resulting in manifestation of *Vyadhi*.[10]



Manifestation of Vyadhi

Pittaja Pandu [11]:

If the *Pitta Prakriti Purusha* indulges in *Pitta Prakopaka Nidana*, the *Pitta Dosha* gets vitiated causing vitiation of *Rakta Dhatu* resulting in manifestation of *Pittaja Pandu*.

It presents with the following *Lakshana: Peeta Harita Varna, Jwara, Daha, Trishna, Murccha, Pipasa, Peeta Varna of Mutra and Shakrit, Swedana, Sheetakamata, Na Annam Abhinandati, Katukasyata, Amla Udgara, Vidaha, Vidagdha, Durgandha, Bhinna Varcha, Daurbalya* and *Tamah.*

Koshtashakhashrita Kamala[12]:

If *Pittaja Pandu Rogi* indulges in *Pittakara Nidana*, vitiated *Pitta Dosha* vitiates the *Rakta Dhatu* further and then results in *Koshtashakhashrita Kamala*.

It presents with following *Lakshana: Bhrisha Haridra Netra, Haridra Varna* of *Twak, Nakha* and *Anana, Rakta Peetata* of *Shakrit* and *Mutra, Bheka Varna, Hatendriya, Daha, Avipaka, Aruchi, Dourbalya, Sadana* and *Krishata*.

Bile metabolism[13]:

The life span of red blood cells is 120 days. After that, it gets destroyed by macrophages of the Reticuloendothelial system in the Spleen and Liver. Bilirubin is derived from Haemoglobin by the degradation of red blood cells. In macrophage, Haemoglobin gets cleaved into 2 parts i.e., protein part – Globin and non-protein part - Haem. This globin may be reutilised for the formation of Haemoglobin or get degraded into amino acids and Haem is later cleaved to form Biliverdin by the enzyme Haem oxygenase with the release of Fe^{3+}. Green-coloured Biliverdin gets converted into yellow-coloured Bilirubin by the enzyme Biliverdin reductase. Bilirubin from macrophages enters the blood circulation. In plasma, it is transported by binding with Albumin. This is Unconjugated Bilirubin or Indirect Bilirubin.

Because of binding with Albumin this is not filtered through the Glomerulus of the Kidney and hence does not appear in the urine. This unconjugated bilirubin is taken up by the sinusoidal surface of hepatocytes through active transport. In the Liver, bilirubin gets conjugated with two molecules of Glucoronate resulting in the formation of water-soluble Bilirubin diglucuronide. This Conjugated or Direct Bilirubin is excreted into bile canaliculi through a concentration gradient which then enters the bile. Around 98% of Bilirubin that enters the bile is conjugated. This Conjugated Bilirubin is hydrolysed by the specific bacterial enzyme to liberate Bilirubin and is converted into Urobilinogen. A small part of Urobilinogen is reabsorbed into circulation, converted into Urobilin, and through the Kidney excrete along with urine. A major part of Urobilinogen is converted into Stercobilin by bacterial action which is excreted along with faeces.

Jaundice[14]**:**

Jaundice is characterised by yellowish discolouration of the sclera and mucous membrane. This is due to the increased level of total bilirubin in serum, usually beyond the level of 2 mg/dl.

Jaundice is classified into three types as Pre-Hepatic, Hepatic and Post Hepatic Jaundice.

1. Pre-hepatic jaundice/ haemolytic jaundice: In this case, Jaundice is caused by the rapid increase in the breakdown and destruction of the red blood cells (hemolysis), this results in the increase of Unconjugated (Indirect) Bilirubin in the plasma. Excessive breakdown of red cells may be due to abnormalities within the cells (intrinsic) or factors external to the cells(extrinsic).

2. Hepatic jaundice: Here, Jaundice is caused due to disease or damage of the parenchymal cells of the liver.

3. Post-Hepatic jaundice: In this, there is an obstruction to the flow of bile in the extrahepatic ducts. Here the increased level of Conjugated Bilirubin in serum is due to decreased excretion of bile or backward leaking of the

pigment is observed.

Hemolytic anaemia[15]:

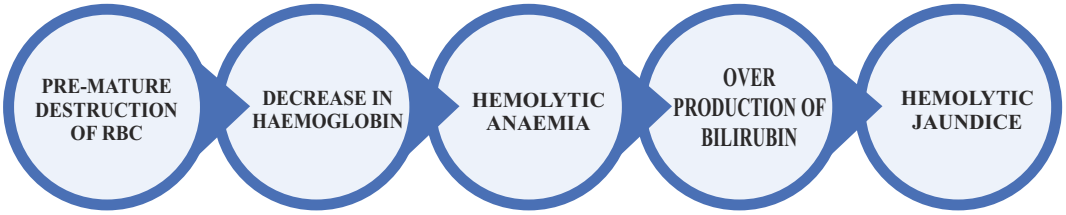
Hemolysis refers to the premature destruction of red blood. In Hemolytic anaemia, shortened red cell life span – elevated erythropoietin levels and a compensatory increase in erythropoiesis, accumulation of haemoglobin degradation products due to hemolysis, are observed.

The physiologic destruction of red cells takes place within macrophages, which are abundant in the spleen, liver, and bone marrow. This process is triggered by age-dependent changes in red cell surface protein which results in their recognition and phagocytosis.

Extravascular haemolysis is generally caused by alterations that render the red cell less deformable. Irrespective of the cause, it presents with Anaemia, Splenomegaly and Jaundice. Intravascular haemolysis may be generally caused by mechanical injury, complement fixation, or intracellular cells.

Hemolytic Jaundice:

Hemolysis leading to over-production of Bilirubin: Rapid breakdown and destruction of red blood cells lead to a decrease in the Haemoglobin thus increasing the production of indirect bilirubin in the plasma. Due to its increase, the Liver becomes unable to conjugate and remove the excess bilirubin which results in an increase in Bilirubin. Thus, presenting with yellowish discolouration of the sclera and mucous membrane (Hemolytic Jaundice).



Hemolysis Leading To Hemolytic Jaundice

Discussion

Kamala is the *Avastha Bheda* of *Pandu Vyadhi*. The Cardinal feature of *Pandu* and *Kamala Vyadhi* is discolouration of skin, sclera, urine, etc. Acharya Sushruta, considered *Kamala* as *Pandu Bheda* itself. *Pandu* is *Rasa Pradoshaja Vikara* and *Kamala* is *Rakta Pradoshaja Vikara* but it is explained under the same *Adhyaya* i.e., in *Pandu Chikitsa* in Charaka Samhita.

Dosha vitiates a *Srotas* and respective *Dhatu* resulting in a *Vyadhi*. The same *Dosha* which has vitiated a *Srotas* is likely to vitiate the nearby *Srotas*. Hence, in the course of illness, Dosha vitiating a *Srotas* and *Dhatu*, spreads and vitiates nearby *Srotas* and *Dhatu* producing a new *Vyadhi*.

Pitta Pradhana Rasa Pradoshaja Pandu may result in *Pitta Pradhana Rakta Pradoshaja Koshtashakhashrita Kamala*. *Koshtashakhashrita Kamala* occurs as *Paratantra Vyadhi* (Disease which manifests secondary to some other disease) due to *Pitta Pradhana Rasa Pradoshaja Vikara* such as *Pandu, Jwara,* etc.

Bahupitta Kamala is caused as the result of a progression of *Pitta Pradhana Pandu*. *Pandu* is *Pitta Pradhana Rasa Pradoshaja Vyadhi*. The *Pitta Pradhana Tridosha* causes vitiation of *Dhatu*. This vitiation of *Dhatu* refers to *Nissarata* of *Dhatu* especially *Rakta Dhatu*, leading to the depletion of *Sneha Guna* and *Ojo Tulya Guna*. Thus, resulting in *Shareera Shaitilya* and *Gaurava*. *Vaivarnyata* is caused due to *Pitta Dosha Prakopa* and *Apaghata Dhatu Sara*.

Pittapradhana Tridosha is responsible for the manifestation of both *Raktapitta* as well as *Pandu*. In *Raktapitta, Raktaadhikya* and in *Pandu Rakta Kshaya* is observed.

In *Pandu, Rakta Kshaya* occurs in 2 modes -

1. Rakta Poshaka Saara Bhaga Anutpatti – which means nonproduction of the nourishing part of *Rakta Dhatu*. This may be understood as the condition of Nutritional deficiency.

2. Rakta Poshaka Rasasya Pittena Kshapana – which means the destruction of *Sukshma Bhaga* of *Rasa Dhatu* that nourishes the *Rakta*. This may be understood as the process of Hemolysis.

Pittaja Pandu: Hemolytic Anaemia

Vitiated *Pitta Dosha* is the one that specifically causes *Rakta Dushti* resulting in *Pittaja Pandu*. This is because the same *Nidana* causes vitiation of both *Pitta Dosha* and *Rakta Dhatu* due to their *Ashraya-Ashrayi Bhava*. Here *Pitta Dosha* specifically affects *Rakta* refers to *Kshapana* of *Rakta* by *Pitta* which is understood as Hemolysis. Hence, *Pittaja Pandu* is referred to Hemolytic anaemia.

Koshtashakhashrita Kamala: Hemolytic Jaundice

Acharya Charaka, while explaining the *Samprapti* of *Bahupitta Kamala/ Koshtashakhashrita Kamala* mentioned that if *Pittaja Pandu Rogi* indulges in *Pittakara Nidana*, he is likely to develop *Koshtashakhashrita Kamala*. Meaning, morbidly vitiated *Pitta Dosha* vitiates the *Rakta Dhatu* further and then results in *Koshtashakhashrita Kamala*. It is the same *Pitta Dosha* that gradually involved the *Raktavaha Srotas* from *Rasavaha Srotas* resulted in *Koshtashakhashrita Kamala* from *Pittaja Pandu*.

Conclusion:

Dosha is responsible for the manifestation of a *Vyadhi*. *Dosha* vitiates a *Srotas* and respective *Dhatu* resulting in disease. The same *Dosha* which has vitiated a *Srotas* vitiates the nearby *Srotas*. Hence, in the course of illness, *Dosha* vitiating a *Srotas* and *Dhatu*, spreads and vitiates nearby *Srotas* and *Dhatu* producing a new disease. *Pitta Pradhana Rasa Pradoshaja Pandu* may result in *Pitta Pradhana Rakta Pradoshaja Koshtashakhashrita Kamala*. Thus, *Pittaja Pandu* acts as *Nidanarthakara Roga* for *Koshtashakhashrita Kamala* and *Pittaja Pandu Rogi* indulging in *Pittala Nidana* becomes *Utpadaka Hetu* for the manifestation of *Koshtashakhashrita Kamala*.

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