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Critical Analysis of *Yakrit Vikaras* with special reference to Contemporary Science

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ABSTRACT

Yakrit is considered as one of the *koshtanga* in human body. Yakrit is the *moolasthana* of *raktavaha srotas* which maintains the quality as well as quantity of *rakta* .*Raktadhatu* is formed in yakrit by the action of *ranjakapitta* on *rasa dhatu*. Liver being a multiple functioning organ in our body does the function of digestion, metabolism, regulation, detoxification, storage, synthesis and excretion. There is no description of *Yakrit vikaras* (liver disorders) as a separate entity in Ayurvedic classics only Bhavaprakasha mentioned it as a separate chapter. Descriptions are available in brihatrayis which explains the involvement of *Yakrit* in several disease conditions such as *Pittaja Pandu*, *Kamala* and its types, *Yakritdora*, *Yakrit vidradhi*, *Raktapitta*, *Madatyaya* and *Jwara*, *yakrit* or *kalakhanda* gets affected.

KEYWORDS

Yakrit Vikaras, *Kamala*, *Jaundice*

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INTRODUCTION

Yakrit along with *Pleeha* are the seats of *raktavaha srotas*[1]. They are the abodes of metabolism of *rakta dhatu*. *Rasa* is derived from the *annavaha srotas* as the end nutrient product of digestion. This initial *ahara rasa* is carried into the liver, where it gets admixed with *rakta dhatu* and becomes a homogenous liquid dhatu. This admixture of *ahara rasa* and *rakta dhatu* is facilitated by the *ranjaka pitta*. From here on the activity of *dhatvagni* begins. This initial *rasa dhatu* admixed with *rakta dhatu* is progressively transformed into different *dhatus* by the action of *dhatvagni*. All these activity of *dhatvagnis* is referred as *dhatu parampara*. *Rakta dhatu* by the action of *raktagni* is differentiated into 3 portions. Major portion becomes *rakta dhatu*, minor portion becomes *mamsa dhatu* and the third portion of this activity is *mala pitta*. This *mala pitta* is yellow in colour and is transported into the *koshta* from the *raktavaha srotas* which in turn imparts yellow color to the fecal matter.

The nutrients absorbed from the gastrointestinal tract are taken into the liver and detoxified. Liver is responsible for protein metabolism, excretion of bilirubin and also synthesizes different components of the blood that include amino acids, albumin, prothrombin, fibrinogen, coagulation factors and thrombopoietin[2]. All these activities can be attributed to *ranjaka pitta*. The levels of serum proteins, prothrombin time, SGOT and SGPT are the indicators of normal functioning of *ranjaka pitta*. The decomposition of the RBC and the production of the bile may be attributed to the activity of r*aktagni*. So the normal values of serum bilrubin are indicators of normal functioning of *raktagni*. The stercobilinogen in the gastrointestinal tract derived from the bilirubin that imparts color to the stools may be termed as *mala ranjaka pitta*.

Yakrit is considered as one of the major organ that performs all major metabolic functions and the disturbance of which may result in many *Yakrit vikaras*. Constant and excessive use of *pitta prakopa nidanas* results in altered functions of *Yakrit*. *Yakrit vikaras* (Liver disorders) are comprehensively elaborated in samhitas where there is structural and physiological integrity of the liver is affected. The diseases include *Pittaja Pandu, Kamala* and its types, *Yakritdora, Yakrit vidradhi, Raktapitta, Madatyaya* and *Pittaja Jwara.*

KAMALA:

The word *Kamala* consists of two words, *Ka=Kaya* (body) +*Mala*=toxins which combines to form *Kamala*. As a whole it signifies accumulation of toxins in the body. In *Charaka chikitsasthana Pandu*

chikitsa adhyaya explains that a person suffering from *pitta pradhana Pandu roga* consumes *pitta prakopa ahara* and *vihara*, the vitiated *pitta* burns *rakt*a and mamsa leading to *Kamala*[3]. In Ayurveda *Kamala* is a disease condition which closely resembles the clinical manifestation of jaundice due to excess aggravation of *pitta*. According to Sushruta *Kamala* is a synonym of *Pandu*)[4] and according to Charaka *Kamala* is a complication of *Pandu*. Two variants of *Kamala* are explained on the basis of pathogenesis and clinical presentation. They are *Koshtashakhasrita* and *Shakhasrita Kamala. Koshtashakhashrita Kamala* is *bahupitta Kamala*[5] and *shakhashrita kamala* is *alpapitta kamala* because of *Kapha pradhana dosha* and *ashayyapakarsha* of normal *pitta*.(Table 1)

Table 1 Classification of *Kamala*

Charaka	Chakrapani	Vaghbhata
***Koshtaasritha Kamala*(Hepatocellular Jaundice)**	*Bahupitta Kamala (Koshtagata)*	*Svatantra Kamala* (occur without *Pandu roga*)
***Shakhaasritha Kamala*(Obstructive Jaundice)**	*Alpapitta Kamala (Shakhagata Kamala)*	*Paratantra Kamala* (Occur with *Pandu roga)*

***Paratantra Koshtashakhasrita Kamala* (Prehepatic/Hemolytic jaundice)**: Indulgence of etiological factors that causes morbidity of *pitta dosha* by a patient suffering from *pandu roga* leads to the manifestation of *paratantra kamala*[6]. There will be morbid *rakta* and *pitta* within the *yakrit* and abnormality of *raktagni* leads to excess generation of *mala pitta*. Excess accumulation of *mala pitta* in the s*hakha* is clinically characterized by jaundice and excess accumulation of *mala pitta* in *koshta* is characterized by the discoloration of the stools. Involvement of *ranjaka pitta* is indicated by the reduced hemoglobin in the blood and morbid *raktagni* is indicated by increased unconjugated hyperbilirubinemia in the blood.

***Svatantra Koshtashakhasrita Kamala* (Hepatic/ Hepatocellular jaundice):** The second variety of *Kamala* is characterised by excess production of *mala pitta*. This belongs to the category of *bahu pitta Kamala* as morbid *pitta* is present both in *koshta* and *shakha*[7]. Altered functioning of *raktagni* can be identified by increased levels of conjugated and unconjugated bilirubin associated with marked elevation of liver enzymes (SGOT, SGPT). It will be clinically characterized by yellowish discoloration of eyes, skin, nails and face of the patient, burning sensation, indigestion, weakness and anorexia.

***Shakhasrita Kamala* (Post hepatic/Obstructive/Cholestatic Jaundice**): This type of *Kamala* is characterized by impaired excretion of *mala pitta* into the *Koshta*. *Mala pitta* continue to form normally due to the action of *raktagni* but the clearance of *mala pitta* is affected thus it gets accumulated in *shakha* and manifests as Shakhashrita Kamala. Since mala pitta is not reaching *Koshta*, *Malaranjana* is not taking place properly resulting in SwetaVarchas (Clay colored stools)[8]. Altered functioning of *raktagni* can be identified by increased conjugated bilirubin levels and obstruction to the clearance of *mala pitta* can be diagnosed by the increased levels of alkaline phosphatase.

***Kumbha Kamala* (Portal Hypertension):** Kumbha means *Koshta*. This type of Kamala occurs as a complication of Svantantra Kamala. When Kamala persists for a long time then it will result in Kumbha Kamala[9]. Since the *dhamani* arising from the *yakrut* gets involved there will be abdominal distension. It is clinically characterized by *Krushna-peeta varchas* and *mootra* (black and yellow colored stools and urine), *shotha*(oedema), *rakta chardi* (bleeding tendency), flapping tremors, *aruchi*(anorexia). Portal hypertension is defined as hepatic venous pressure gradient above 5 mm Hg. It results from a combination of increased flow into the portal circulation and/or increased resistance to portal blood flow[10]. This can be diagnosed by abdominal USG.

Halimaka* (Hyperbiliverdinemia*): It is also called *lagharaka* and *alasa* according to Sushruta[11]. In this variety of *Kamala, Vatapitta* dominant lakshanas are seen. There will be symptoms like *mridu jwara* (febrile illness), *bhrama* (dizziness), *trishna* (morbid thirst), bhrama (drowsiness) and *angamarda* (debility). The color of the *mala pitta* will change from yellowish to blackish green due to addition of morbid *vata dosha*[12]. Hyperbiliverdinemia (HBLVD) is a clinical sign seen in conditions like Liver cirrhosis or hepatocellular carcinoma. The impairement of bilirubin/biliverdin pathway may result in green jaundice and a green discoloration of body fluids.

***Pittaja Pandu* (Hyperbilirubinemia due to shunt bilirubin**): *Rasa* is formed into *rakta* in *Yakrut* by the action of *ranjaka pitta*. The production of *rakta dhatu* itself is affected due to poor conversion of *rasa* into *rakta* due to the impairment of *ranjaka pitta* resulting in *pandu varna*. Further the *rakta dhatwagni* when abnormally increased results in more production of *pitta mala* which is yellow in color. This *mala pitta* is taken into *hridaya* and is circulated all over the body. Further this *pitta mala* is

deposited in the eyes, nails and skin manifesting as *pittaja pandu*. There will be symptoms like *jwara***(**fever), *daha* (burning sensation), murcha (fainting),*trishna* (thirst),*amlaudgara* (sour erectations),*vitbheda* (diarrhea),*dourbalya* (weakness)[13]. The pathophysiology of *pittaja pandu* is similar to the hyperbilirubinemia due to shunt bilirubin. Primary shunt hyperbilirubinemia (PSHB) is characterized by increased levels of unconjugated bilirubin associated with ineffective erythropoiesis and a hyperplastic bone marrow. In certain forms of anemia like sideroblastic anemia, megaloblastic anemia the pathology is characterized by presence of immature and defective red blood cells.

Yakritodara: *Yakritodara* is one among the eight types of *udara* where there is direct involvement of the organ has been mentioned, etiopathogenesis of *yakritodara* and *plihodara* are similar except the anatomical location. It is classified into five types as v*ataja, pittaja, kaphaja, sannipataja* and *raktaja* and again based on the etiopathogenesis it is classified into *chyuta* and *achyuta yakrut vriddhi.* One by *chyuta* (displacement) and other by *achyuta vriddhi* (not displaced). *Chyuti* means displacement from its own place. In a*chyuta* type, *dusta rasadi dhatu* is considered in the pathogenesis of *yakrutodara*[14].

***Yakrit vrudi/udara by Sthanatchyuti*: Hepatoptosis (Wandering liver)**

Atisankshobhadi (Activities like travelling or heavy exercises that involve violent jerky movements of the body) results in *abhighata* (external injury) to *shareera* and if it happens to *udara pradesha*(abdominal region), there is a possibility of *sthanat chyuti of yakrut* (structural displacement of Liver) Because of the *agantu hetu, vyadhi* develops all of a sudden and simultaneously *dosha kopa* develops. *Abhighata* (external injury), *atisankshobha* (excessive irritating food) etc results in vata prakopa. *Sramsana* is one of the vata prakopa lakshana. *Sramsana* refers to *sthanat* cyuti(prolapse/dislocation).

***Yakrit vrudi/udara by Vyadhikarshanjanya (Sthanatachyuta*) : Hepatomegaly**

Yakrut vruddhi/udara may also occur by *sonitha vruddhi*. When *vikruta sonitha vruddhi* takes place it is likely to vitiate the *moola-yakrut/pleeha.* The *dusta sonitha vruddhi* takes place because of *raktadustikara hetu* and *dusti* of other *srotas*. In the *samprapti* of *achyuta yakrut vruddhi* it is clearly mentioned *rasa* and *raktavaha sroto dusti* results in *rakta vruddhi* there by *yakrutodara. Chakrapani* has added *mamsvaha srotodusti* responsible for *rakta vruddhi*.

Rasa pradoshaja diseases like *jwara, pandu, hridroga* are likely to produce *shotha, kamala* and *yakrut roga*. Going through the descriptions of *pittaja, kaphaja, sannipapaja* , *vishama* and *dhatugata jwara*, very frequently we get *lakshana* of *kamala, pandu, shotha, raktapitta* etc. *Susrutha* while explaining the *nidana of kamala* says, this disease may manifest after *pandu* or *anyaroga*. That means a patient suffering from *pittapradhana rasapradoshaja* vikara likely to develop *pittapradhana raktapradoshaja vikara*. In this way, *rasapradoshaja vikara* acts as *nidana* for *raktapradoshaja vikara* and in due course it may result in *raktavaha sroto mula vikruti* there by *yakrutodara*.

Chyutha and Achyuthavrudhi lakshana (Symptoms of hepatoptosis and hepatomegaly)

Vardhaman Pliha (There will be progressive enlargement of the *Yakrit.* Liver becomes stony hard initially and on palpation feels like a tortoise back and if neglected the enlarging *yakrit* puts pressure and expands over the *kukshi*, remaining part of the abdomen and *agniadhisthana*, *dourbalya*(debility),*arochaka* (lack of taste in the mouth), *avipaka* (indigestion), *varchagraha*(Constipation*),* *mutragraha*(Retention of urine*),* *tamapravesha*(Darkness infront of the eyes), *pipasa (*excessive thirst), *angamardha*(malaise), *chardi*(vomiting), *moorcha* (Transient loss of consciousness), *angasada* (Tiredness of body parts), *kasa(*cough), *swasa*(dyspnoea), *mridu jwara* (mild fever*),anaha*(flatulence*),* *agninasha*(loss of appetite*),* *karshya*(emaciation*),* *asyavairasa* (abnormal taste in the mouth*),* *parvabheda*(pain in joint of the digits) ,*Koshtashoola*(abdominal pain),*Vatashoola* (abdominal pain due to morbid vata), *Udara arunavarana* (red discoloration of the abdomen) ,*Udara vivarna*,(discoloration of the abdomen) *udara neelaharitaharidra raji*(appearance of network of veins having blue, green or yellowcolor).

Yakrit vidhradhi (Hepatic abscess): *Vidradhi* is characterized by *sheekhra vidhaha* (rapid inflammation). *Vidradhi* is divided into *bahya*(external) and *abhyantara* (internal). *Yakrit* is one of the locations of *antarvidradhi* (intra abdominal abscess). An abscess in the liver is identified by the classical clinical sign of breathlessness with morbid thirst.[15.] This can be correlated with amoebic, pyogenic liver abscess and Hydatid cyst (echinococcus) of the liver.

Table 2 *Yakrit Vikaras* and its probable clinical correlation

Yakrit Vikaras	Probable modern diagnosis
Koshta-sakhasrita Kamala	Hepatocellular jaundice (Viral hepatits, hepatoma)
Sakhasrita Kamala	Obstructive jaundice of varied etiology
Kumbha Kamala	Portal hypertension
Halimaka	Hepatic encephalopathy
Panaki	Chronic hepatitis
Jalodara	Ascitis with portal hypertension
Yakrutvidradhi	Amoebic, Pyogenic liver abscess, Hydatid cyst

CONCLUSION

The diseases of *Yakrit* are characterized by the involvement of *ranjaka pitta*, *rakta dhatvagni*, *mala pitta* and *dhamani* arising from the *Yakrit. Peeta/Haridra netra*(Icterus) is one of the commonest clinical sign of *Yakrit vikaras*. This sign is described in diverse disease conditions like *Kamala* and its variants, *Pittaja pandu*, *Pittaja Jwara*,. *Koshtashakhasrita Kamala* can be correlated with prehepatic and hepatocellular jaundice due to viral hepatitis and hepatocellular carcinoma. *Shakhasrita kamala* can be correlated with obstructive jaundice of varied aetiology. The pathophysiology of *pittaja pandu* is similar to hyperbilurbinemia due to shunt bilirubin. Complications of *Koshtashakhasrita Kamala* such as *Kumbha Kamala* and *Halimaka* matches with Portal hypertension and hyperbiliverdinemia. The hemorrhagic complications of hepatic failure are identified as *Raktapitta*. Ascitis developing as a complication of hepatic cirrhosis is identified as *Jalodara*(Table 2). In this way primary diseases of liver and its pathological consequences are named with diverse disease conditions in Ayurveda.

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