

## The Evaluation of *Rakta dhatu dushti in Yakrut dushti* w. s. r. to *garbhasya yakrut pleehanau shonit jau* : an observational study

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### ABSTRACT –

Liver performs vital functions of the body. Hence, liver damage leads to disability adjusted years of life. Liver damage can be reversed up to the stage of fatty liver. As per Ayurveda *Rakta dhatu* chikitsa is helpful in treating *Yakrut dushti* considering the concept of *Avayav utpatti siddhant*. Here, an observational Survey study was done to prove that *Rakta dhatu dushti* is seen in Liver Cirrhosis. A sample size of 57 patients, pre diagnosed with Liver cirrhosis, was examined. Their Radiological reports and cbc reports were collected, analysed and a statistical inference was drawn using the Chi square test. Observations were made from the statistical inference. This study proved a correlation between Liver cirrhosis and *Rakta dhatu dushti* (hematological indices – pancytopenia, mainly thrombocytopenia). Liver being the moola sthana of *Rakta dhatu*, in liver cirrhosis, symptoms are seen all over the body,

leading to disability adjusted years of life, hereby, proving *Rakta dhatu dushti in Yakrut dushti* and hence *Rakta dhatu* chikitsa can be considered to prevent Liver damage.

### KEYWORDS

*Yakrut dushti*, *Rakta dhatu dushti*, *Avayav utpatti* siddhant, Liver cirrhosis, haematological indices, *Rakta dhatu* chikitsa

### INTRODUCTION –

*Rakta dhatu* circulates throughout the body from the hyruday through the *Rakta vaha dhamanis*<sup>1</sup>. *Rakta* itself is life (*Raktam jeeva iti sthiti*). Acharya Sushrut opines that *Rakta dhatu* is the base of living and it maintains life sustenance. The body is dependent on *doshas*, namely Vata (kinetic energy), Pitta (thermal energy), Kapha (potential energy), and *Rakta* (blood) that avoid any deviation of the body from its homeostatic state<sup>2</sup>.

*Prinan* and *Mansa dhatu pushti* are the functions of *Rakta dhatu*<sup>3</sup>. Person endowed with *Rakta dhatu* sarata shows signs of clarity of complexion, physiological functioning of sense organs, natural urges of the sensory organs, normal gastric function, happiness, nourishment and strength<sup>4</sup>. *Rakta* and *pitta* dosha have *ashrayashrayi sambandh*. *Madhya Sharir* is the *sthana* (main functional area) of *pitta* dosha<sup>5</sup>. *Yakrut* and *Pleeha* are the *moolasthanas* of *Raktavaha strotas* and *Rakta dhara Kala* (endothelium) that lines *Yakrut*, *Pleeha* and *Sira*<sup>9</sup> that lie in *Madhya Sharir* in *Koshtanga*<sup>6</sup>. They perform vital functions of the body<sup>7</sup>, they are made of sinusoids, stores and filters blood, make WBC that protect from infection, helps keep harmful microorganisms away from the bloodstream, removes unhealthy and old RBC out of the bloodstream, stores blood. Hence, *Yakrut dushti* shows gross lakshanas<sup>8</sup> all over the body. Liver cirrhosis leads to disability adjusted year of life with encephalopathy, ascites, edema, cellulitis, jaundice, fatigue, coagulopathy, making life difficult<sup>10</sup>.

*Rakta vaha strotas* (channel of blood) gets vitiated by food particles causing a burning sensation to the body, excessive intake of unctuous substances, exposure to sun or fire<sup>11</sup>. Vitiating of *Rakta vaha strotas* (channels of blood) is also caused by *pitta* aggravating factors, day sleep, eating during indigestion and eating antagonistic food<sup>12</sup>.

Worldwide, there is increasing prevalence of the metabolic syndrome (NAFLD-NASH) which is a lifestyle disorder<sup>13</sup>. Obesity, diabetes mellitus, increased alcohol abuse, drug abuse, damage the hepatocytes, leading to fat accumulation. Ayurveda mentioned *Yakrut vikara* under

*Pleeha roga*. Liver damage occurs in stages, Inflammation starts with fat accumulation, as *mithya ahara vihar* continues inflammation continues, fibrosis sets in, leads to cirrhosis and finally end stage liver disease<sup>14</sup>. Liver disease can be picked in early stages. Fatty liver is frequently seen on USG screens in clinical practice, this stage of liver disease is treatable as liver cells regenerate. Once fibrosis sets in liver damage is irreversible. Here, as per Ayurvedic principle of *Avayav utpatti*, *Rakta dhatu* chikitsa can be considered. To understand the human body and the co relation of structural information of the organs with the disease, Ayurveda has established theories regarding various etiological factors and pathogenesis, one such theory is the *Avayav utpatti Siddhant* – discussed in *Sushrut Shariratan Adhyay 4*<sup>15</sup>. As per the *Siddhant*, an order is maintained in the development of the organs during the embryonic stage of development.. The study is carried out to prove there is *Rakta dhatu dushti* in Liver cirrhosis with special reference to *Garbhasya Yakrut Pleehanau Shonit Jau*, that says *Yakrut* is produced from *Rakta dhatu*<sup>15</sup> and hence, *Rakta dhatu* chikitsa can be considered in *Yakrut vikara*.

## MATERIALS AND METHODS

It was an observational study performed on pre-diagnosed Liver cirrhosis patients. Previous Radiological reports and blood tests were observed and a statistical inference was drawn.

### Inclusion Criteria:

1. Age group 7yrs to 70 yrs.
2. Pre diagnosed cases of Liver cirrhosis were considered.

3. Both sexes i.e. Male & female were included.

**Exclusion Criteria:**

1. Age group <6 yrs. and > 70 yrs. were excluded.
2. Sero positive patients
3. Patients with kidney disease,
4. Patients on immunosuppressant.
5. Patients with blood disorders or malignancies.

**Ethical statement**

Ethical clearance was obtained from the Institutional Ethics committee of the College in 2022. All the participants were clearly explained the purpose of the study and written consent was obtained from all of them before conducting the study. Furthermore assurance of maintaining confidentiality was given to all the participants.

**Sample size calculation:**

$$n = \frac{(Z_{\alpha} + Z_{\beta})^2 [p(1-p) + q(1-q)]}{(p-q)^2}$$

<sup>29</sup>where  $Z_{\alpha}$  is the z variant of alpha error i.e. a constant with value 1.96  
 $Z_{\beta}$  i.e. a constant with value 0.84  
 p, q are proportions of the variable, values of which are taken from the parent article.

n= 51.21

A minimum of **52** subjects were needed to complete the study.

**OBSERVATION**

**Anaemia<sup>30</sup>**

- \* 50 out of 57 patients had anaemia

**Leukopenia<sup>30</sup>**

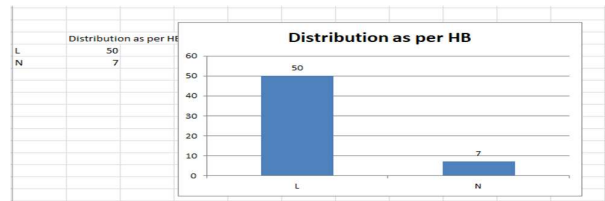
- \* 19 out of 57 patients had leukopenia

**Thrombocytopenia<sup>30</sup>**

- \* 42 out of 57 patients had thrombocytopenia

**Statistical Analysis**

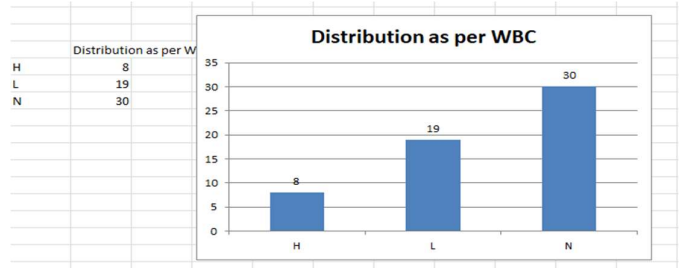
**1) Anaemia among the sample size**



**Anaemia<sup>30</sup>**

- \* 50 out of 57 patients had anaemia
- \* P value noted was 0.514

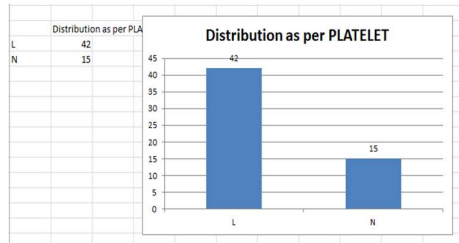
**2) Leukocytopenia among the Sample size**



**Leukopenia<sup>30</sup>**

- \* 19 out of 57 patients had leukopenia
- \* P value was 0.209

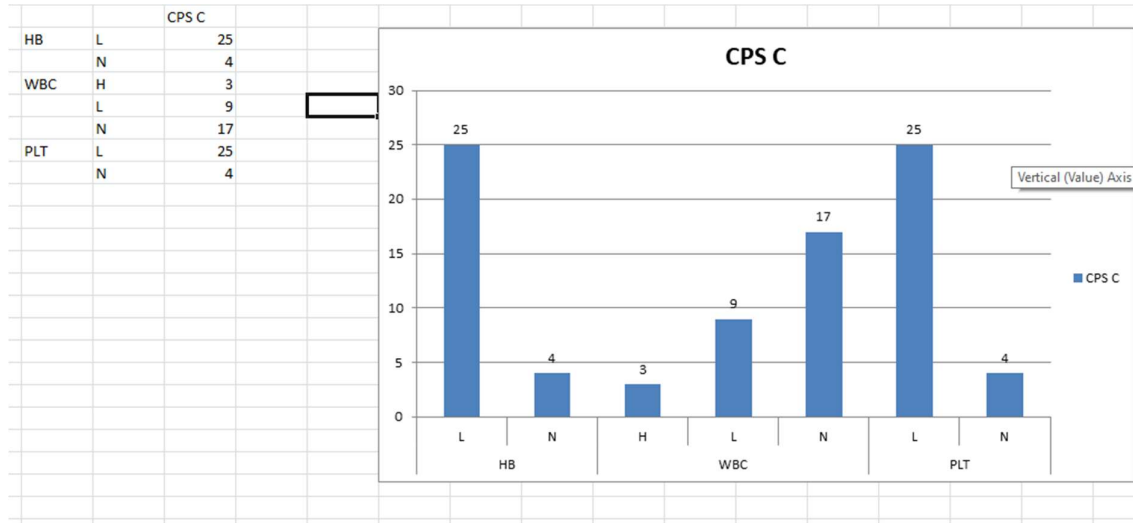
**3) Thrombocytopenia among the sample size**



### Thrombocytopenia<sup>30</sup>

- \* 42 out of 57 patients had thrombocytopenia
- \* P value was 0.496

### 4) Overall presentation of CBC



An overall presentation of CBC in patients with end stage liver disease- under <sup>31</sup>Child-Pugh C score showed an incidence of thrombocytopenia followed by anaemia followed by leukopenia.

On studying the 57 subjects we noted the following,

The incidence of abnormal indices was -

Thrombocytopenia was the most common and earliest index followed by anaemia then leukocytopenia.

- \* 78% of the sample size were males
- \* The incidence of ETOH (alcohol) and NASH were the highest i.e. 39% and 25% respectively.
- \* Age – most of the subjects were between 40-60 yrs.
- \* Occupation – Most of them were business man, engineers, housewives,

i.e. sedentary lifestyle was the common factor.

- \* Alcohol and NAFLD related to metabolic syndrome were the common causes.
- \* The INR value (coagulopathy) and Platelet count is significantly deranged in Alcoholic liver disease.

### DISCUSSION

*Yakrut* is a *Matrujabhava*<sup>16</sup>, as stated by Acharya Sushrut and Charaka in Sharir Sthana. According to Acharya Arunadatta, the three Bhavapadarthas, that is Samana Vayu, Dehoshma, and *Rakta dhātu* take part in the formation of *Yakrut*, *Pleeha*, and *Kloma*<sup>15</sup>. While considering these verses, it has been cleared that all the Acharyas were sure about the major role of *Rakta dhātu* in the development of *Yakrut* (liver). As per modern science, the raw material for

liver and blood production during embryogenesis is the same, i.e. mesoderm<sup>21</sup>.

The moola *sthana*/origin of *Rakta vaha strotas* (channels of blood) is *Yakrut* and *Pleeha*. Liver is responsible for converting *Rasa dhatu* (clear plasma) to *Rakta dhatu* (blood), by both *Tejani* and heat of *pitta* (thermal energy)<sup>17</sup>. *Rakta dhatu* is formed from *Ahara rasa*, which is colourless. When it reaches *Yakrut* (liver) and *Pleeha* (spleen), by the help of their *ushna guna* (hot nature), this *rasa dhatu* (plasma) is converted to *Rakta dhatu* (blood)<sup>18</sup>. *Ranjak pitta* situated in *amashaya* or *Yakrut* and *Pleeha* gives the red colour to *Rakta dhatu* (blood)<sup>19</sup>. Thus *Rakta dhatu* is synthesized in the liver.

*Yakrut*, *Pleeha* and *Sira* are the *sthana* of *Rakta dhara Kala* that is *Rakta dhatu* is present in large amounts in them as they're made up of sinusoids, and are lined by the endothelium. Endothelium is now recognised as a complex endocrine organ responsible for vascular homeostasis. It's responsible for maintaining vasomotor tone, homeostasis and thrombosis, inflammatory process, platelet and leukocyte vessel-wall interactions and controlling vascular permeability<sup>20</sup>. Hence damage to these organs leads to viciation of *Rakta dhatu*.

Further we correlate concept of *Rakta dushti* (abnormal haematological indices) as per modern science<sup>22</sup>

#### **Causes of anaemia in liver cirrhosis**

- \* Erythropoietin- protects RBC from apoptosis and enhances the development of precursor RBC. Erythropoietin response blunted in cirrhosis

- \* High (hvpg) -hepato venous pressure gradient higher erythropoietin seen in blood
- \* Sequestration on RBC due to portal hypertension.
- \* Iron deficiency – blood loss
- \* Macrocytic – vitamin b12 deficiency
- \* Aplastic – bone marrow depression

#### **Causes of leukopenia in liver cirrhosis**

- \* Granulocyte- macrocyte colony stimulating factor
- \* Synthesized by immune cells – stimulate bone marrow to produce granulocyte
- \* Bone marrow suppression >> leukopenia

#### **Causes of thrombocytopenia in liver cirrhosis**

- \* Portal hypertension > sequestration of thrombopoietin from splanchnic circulation
- \* Bone marrow suppression mediated by toxins (e. g. Alcohol, hepatitis B and C)
- \* Consumptive coagulopathy (low grade DIC, acquired intravascular coagulation and fibrinolysis)
- \* Blood loss – portal hypertension related gastropathy- enteropathy

#### **CONCLUSION**

Thus, as per the *Siddhant Garbhasya Yakrut Pleehanau Shonit jau*, this study establishes a relation between *Rakta dhatu dushti* in Liver cirrhosis.

Abnormal hematological indices either thrombocytopenia, anemia or leukopenia were seen in all the cases of Liver cirrhosis. Hence, we say there is *Rakta dhatu dushti* in *Yakrut dushti* and therefore, *Rakta dhatu*

chikitsa can be considered in cases of liver disease.

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