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CONCEPTUAL AND CORELATIVE STUDY OF YAKRUT UTAPATI (EMBRYOLOGY OF LIVER)

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ABSTRACT

According to modern science, the visceral organs can be studied with twoperspectives, viz. anatomical observations and physio-pathological derangements. Ayurveda Samhita concise the study under heading of "Sharir". The subject covers the anatomical as well as physiological studies related to the specific organ. Ayurveda narrates the basic principles including Panchamahabhoota, Tridosha, Saptadhatu etc., given embryology and organogenesis. The various organs generate from different combinations of these Bhavapadarthas. The liver is a vital organ for metabolism. Acharyas have opined about the genesis of Yakrut from Rakta Dhatu (blood tissue). A parallel opinion inconventional anatomy states that an abundant quantity of blood is responsible for the formation of sinusoids of the liver. This huge quantity of blood comes from broken viteline and umbilical veins in the septum transversum. On the other hand, the raw material for the formation of blood cells and liver (septum transversum) is the same, being mesenchymal cells from the mesoderm. It is essential to conceptualize the basic genesis of the liver to form the exact pathogenesis and treatment in Ayurveda. The presentresearch is carried out to understand this concept in the light of contemporary science. This may be helpful while treating the disorders of the liver.

INTRODUCTION

The liver is a vital organ for metabolism. Acharyas have opined about the genesis of Yakrut (liver) from Rakta Dhatu (blood tissue). Parallel opinion in modern anatomy states that an abundant quantity of blood is responsible for the formation of sinusoids of the liver. This huge quantity of blood comes from broken vitelline and umbilical veins in the septum transversum. On the other hand, the raw material for the formation of blood cells and liver (septum transversum) is the same, being mesenchymal cells from the mesoderm. The present review was conducted to discover the similarities about the genesis of the liver in the opinions of ancient and modern medical science. This may be useful for utilizing ancient medical science from a new perspective. Therefore, it is attempted to correlate the genesis of the liver in Ayurveda with modern science.

AIMS OF THE STUDY

This study has been conducted to assess the views of Ayurveda and contemporary science based on the genesis of the liver.

MATERIALS AND METHOD

Different Ayurveda Classical textbooks Charaka Samhita with Sanskrit Commentary of Chakrapani and Hindi Commentary of different Ayurveda scholar, Sushruta Samhit awith Sanskrit commentary of Dalhana and Hindi commentary of different Ayurveda scholars like Prof. Ambika Datta Shastri Kashyapa Samhita, Hindi and English commentary, different Ayurveda journal articles, different textbooks of embryology (Prof. IB Singh, Vishram Singh, different textbooks of Anatomy like BD Chaurasia HumanAnatomy.

REVIEW OF LITERATURE

शोणितस्य स्थानं यकृतप्लीहानौ।। (सु.सू.14/4)

द्वितीया रक्तधरा मांसस्याभ्यन्तरतः, तस्यां शोणितं विशेषतश्च

सिरासुयकृतप्लीह्येश्च भवति।। (सु.शा.4/10)

रक्तवहे द्वे, तयोर्मूलं यकृतप्लीहानौ रक्तवाहिन्यश्च धमन्यः।। (सु.शा.9/12)

PARYAYA (SYNONYMS): Kalakhanda, Jyotisthana, Yakrutkhanda, Yakrutpinda, Raktadhara and Raktashaya are found in the ancient literature. (चा.स.सू.प.क.94)

KALAKHAND: This word is also used as a synonym of Yakrut in the Sushruta Samhita.

JYOTISTHANA: Jyoti means Agni. The site of Agni is called the Jyotisthana. Fetal nutrition usually depends on Ahara Rasa, categorized under maternal factors and Vayu present in Jyotisthana and responsible for cell division. The Ahara Rasa is first received by Jyotisthana, which further nourishes the Therefore, Jyotisthana means "liver".

YAKRUTKHANDA: In Ashtanga whole body. Hrudaya, Acharya Vagbhata has used this word with regards to the description of diseases. In modern science, Yakrutkhanda means lobes of the liver.

RAKTADHARA/RAKTASHAYA: Yakrut is a site of Rakta Dhatu. Blood is stored in the therefore, Raktadhara or Raktashaya words been used in Sushrut Samhitas.

VARNA (COLOR): In the classics, various references regarding the colour of Yakrut can be seen during the elucidation of signs and symptoms of diseases. The colour of Vidradhi is similar to the colour of Yakrut, i.e., Krushnalohitam (reddish-brown). Acharya Vagbhata has compared the colour of Arsha with Shukajihva, i.e., the tongue of parrot, Pittaja Yakrutkhanda and Jalouka. In Sharira Sthana, he has stated the critical condition of the patient in Atisara (diarrhoea). - "If the colour of stool is like the Yakrutpinda or Mansadhavana, the patient will not survive".

SVARUPA (APPEARANCE): According to Bruhadarunyaka Upanishad, the appearance of Yakrut and Pleeha are solid structures like mountains.

STHANA (SITE): The site of the liver is below and right to the heart. Acharya Arundattahas given the same statement.

DISCUSSION

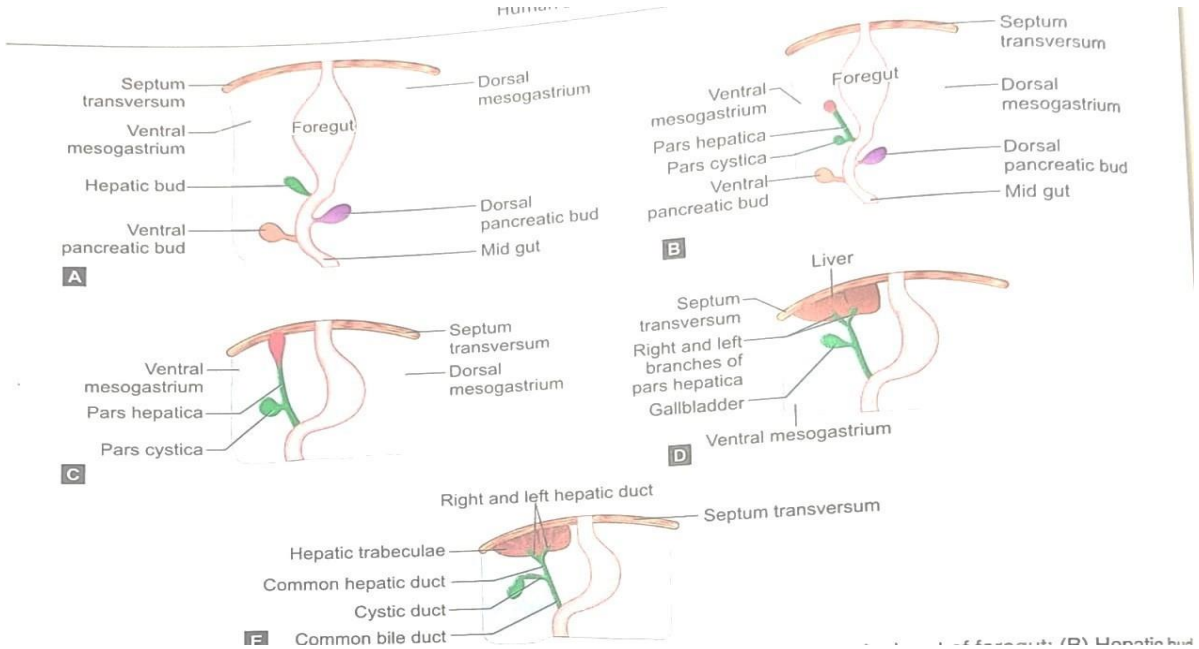
Ayurveda described the formation of the body in the Sharira Sthana in Garbha Avakranti Sharira. Garbha Sharira (Garbha Masanumasika Vikasa) Avakranti means stepwise development. As the body formed or developed in a stepwise manner the term Avakranti has been used. According to Ayurveda Samhitas, the liver develops from Rakta Dhatu. The correlation of this in modern science is: The development of the liver is from the hepatic bud and septum transversum that is the unsplit part of the mesoderm. On the first hand, the mesoderm produces septum transversum and the liver develops from the same. On the other hand, the mesoderm also produces mesenchymal cells, which in turn produce myoblast, chondroblast, lymphoblast, hemocytoblast, etc. The blood cells develop from hemocytoblast

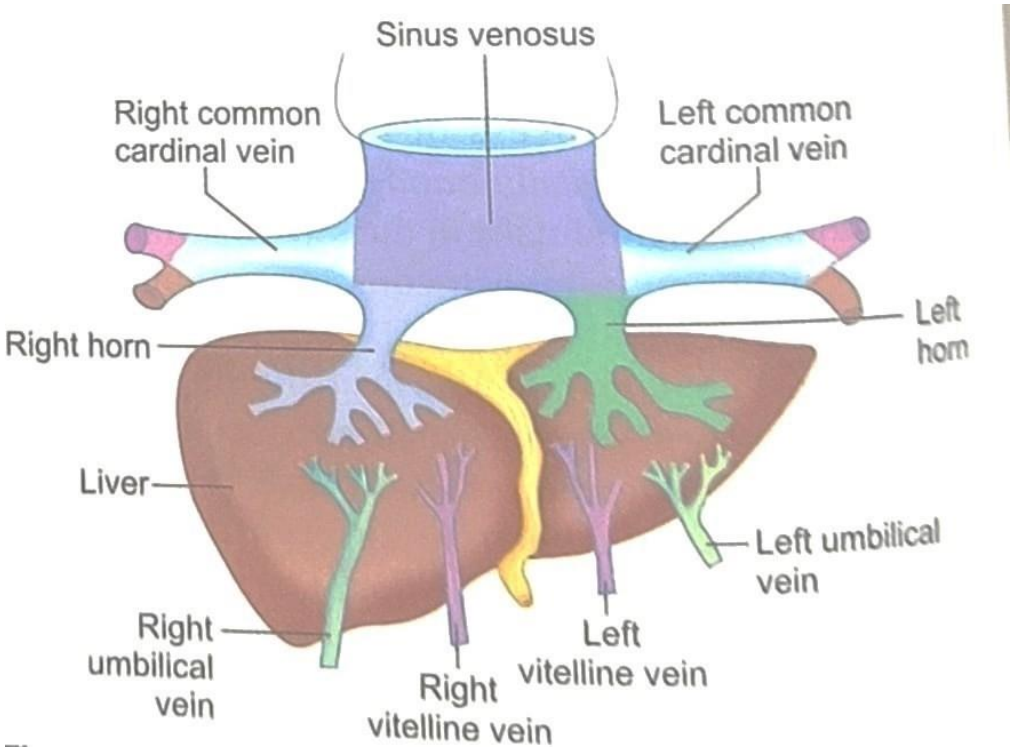
and lymphoblast. Last but not the least, it is seen that the raw material for liver and blood is the same, i.e., mesoderm. Secondarily, the septum transversum is the first site of maternal blood. The umbilical and viteline veins open at the septum transversum; due to this, the septum transversum is rich in blood supply. The hepatic bud grows in the septum transversum and, due to it, the umbilical and vitelline veins are broken up forming the liver sinusoids. It indicates that blood plays an important role in the development of the liver. There are two embryological sources for development of liver. So the parenchyma of liver is endodermal in origin while the fibro areolar stroma is mesodermal in origin.

Hence in this manner the references in Ayruveda can be corelate with modern science regarding the development of yakrut.

DEVLOPMENT OF LIVER

A. Origin of hepatic bud from the ventral wall of terminal part of foregut.
B. Hepatic Bud growing into the ventral mesogastrium and dividing in to pars hepatica and pars cystica.
C. pars hepatica growing towards septum transversum through ventral mesogastrium.
D. Division of pars hepatic into right and left parts forming the right and left lobes ofliver.
E. Formation of sheets of hepatic cells.





Adult component	*Developmental derivative*
Gross appearance	
Two lobes	Two terminal divisions of pars hepatica of hepatic bud in contact with septum transversum
Microscopic appearance	
Hepatic cells and intrahepatic biliary apparatus (parenchyma)	Hepatic bud (endoderm)
• Fibrous capsule of Glisson • Connective tissue cells • Kupffer's cells • Hematopoietic cells • Blood vessels	Septum transversum (Intraembryonic mesoderm)
Sinusoids	Absorption and breakdown of vitelline and umbilical veins in septum transversum between hepatic trabeculae

CONCLUSION

The above discussion shows that the embryological origin of the liver is blood tissue as per Ayurveda as well as modern science.

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