International Journal of Ayurveda and Pharmaceutical Chemistry
www.ijapc.com

# IJAPC

VOLUME 11 ISSUE 1 2019

E ISSN 2350-0204

GREENTREE GROUP PUBLISHERS

Int J Ayu Pharm Chem

REVIEW ARTICLE

www.ijapc.com

e-ISSN 2350-0204

# A Study of *Saptakala* W.S.R. to its Modern Prospective

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## ABSTRACT

"Dhatvashyaantarmaryadakala" Kalas are membrane or layer present between SaptaDhatus and Asaya which covers many organ of the body. Kala is an unparalleled hypothesis stated by the Acharya Susruta in SharirSthan. Specific kala present in the specific organs. Kalas are differentiated as snayupratichchhanan (covered from ligaments), jarayusantata (continuation of feotal covering), and slesmavestita (coated with kapha). In modern science membranes are formed, during embryonic phase only, chiefly from three varieties of tissues epithelial, connective and adipose. In this paper I am trying to correlate the anatomical structure as well as physiological function and clinical importance of kala with the modern science.

## KEYWORDS

*Kala, Membrane, Dhatu, Asaya*

Greentree Group Publishers

Received 04/04/19 Accepted 10/06/19 Published 10/07/19

## INTRODUCTION

Saptakalas described by AchayaSusruta in SharirSthan, are situated between Dhatus and Ashaya[1].Kala formation produced by the process or cooking of the fluid part in the dhatus (bodily elements) and in the asayas (receptacles organs) by the heat existing in them (dhatus and asayas). It is just like the formation of essence or sap in the tress (trunk). It is covered byslesma (kapha), snayu (tendenous sheath) and jarayu (chorion). The moisture part of rasa element in its receptacle is cooked by the heat existing in rasa element itself. This is one kala. Similarly seven kalas are produced from seven dhatus[2].Study of kalas is important anatomically as well as physiologically.Anatomically it separates Dhatu and Ashaya in the system where as physiologically it does the (Dharan) of its respective (Dhatu).The clinical study of Kala is more significant when either of the two functions is disturbed, pathology occurs and, so for the treatment purpose[3].

## AIMS AND OBJECTIVES

1. To study of Kala
2. Correlation of Kala in the modern science
3. Study of clinical importance of Kala

## MATERIALS AND METHODS

Literatures of Ayurveda, bhrutrayee and laghutryee along with their commentaries by different authors were referred for the study, modern texts books are utilize to co-relate the concepts, research papers and articles from Journals.

**FORMATION OF KALA-**

Kala is a unique concept described by the Acharya Susruta in SharirSthan (garbhavyakaran)[1] and vishvegachikitsha in Kalpasthan (sarpdastvishavigyaniya)[4].

Formation of kala according to Ayurveda, just as pith is seen when the wood (stem of a tree) is split, similarly when the Dhatus such as mansa (muscles) are cut, kala become visible, these are differentiated as Snayupratichchhanan (covered from ligaments), jarayusantata (continuation of feotal covering), and slesmavestita (coated with kapha)[5].

According to modern, Membranes are formed, during the embryonic period itself, mainly from three kinds of primary tissues – epithelial, connective and adipose.

**1. Epithelial tissue**– This tissue type covers the body and lines cavities, hollow organs and tubes[6].The epithelial tissues has three major functions i.e. selective barrier, secretory, andprotective[7]. Secreting membrane are two types mucous and serous. Mucus membrane secrets thick jelly mucus which is present inside all hallow organs of various system like digestive, reproductive, circulatory, respiratory, excretory system while the serous

membranes secrets thin watery fluid which are present enveloping certain organs[8].

**2. Connective tissue**– Connective tissues are one of the most abundant and widely distributed tissues in the body. In their various forms, connective tissues have of variety of functions[9].Connective tissues serves to hold together, and to support, different elements within an organ[10].These are found in the skin, walls of organs of digestive, circulatory, urinary, muscular and haemopoietic systems[11].

**3. Adipose tissue-**Adipose tissue consists of fat cells, containing large fat globules, in a matrix of areolar tissue[12].It is present in the subcutaneous tissue, bone marrow, abdominal wall, omentum, forms padding around some organs like kidneys, eyeball etc[13].

**TYPES OF KALA IN AYURVEDA-**

Achryasusruta mentioned seven types of kala these are-

**1. Mansadharakala**- is layer of muscles which holds and supports the blood vessels[14].Networks and branches of siras, snayu, dhamni, and srotas are embedded within the same.

Bisa (stem) and mrinala (stalks) of lotus grow constantly all around in muddy water in the ground, similarly siraetc (veins, ligaments and arteries) grow inside the muscle.

**2. Raktadharakala**- aresituated inside the muscles, specially sira,yakrit and pliha as per Acharya Susruta.Just as milky sap flows out when a branch of latex yielding plant is cut(on their bark bruised), similarly when muscles are cut, blood flows out quickly in great quantity.

**3. Medodharakala -** Medas is present in the abdomen and small bones of all living beings, while in big bones it is known as majja. In big bones especially, it is mujja (bone marrow) that is inside them, where as in all others (small, flat, curved bones) it is called saraktameda (red coloured marrow), the pure fat present in the muscles is known as vasa.

**4. Slesmadharakala**- is present in all joints and supporting its life.

Just like the wheel moves easily when its axle hole is lubricated with fat, similarity the joints move freely lubricated with slesma[15].

**5. Purishadharakala**- It is located in the pakvasaya inside the antahkostha, commencing from yakrit and intestine, the maladhara kala separates at the side of unduka[16].

**6. Pittadharakala**- It receives four types of semidigested food that comes from the amasaya and direct towards the pakvasaya. It holds the food till the four types of food (chewable, swallowed, drinks, licked) are totally digested.

7. **Sukradharakala-** which pervades the whole body of all living begins.

Just as ghee is present in milk and jaggery in sugarcane juice in the same way the sukra is prevalently present throughout the human body.

Sukra comes out through the urinary passage of man, from a distance of two angula beneath the opening of the urinary bladder on the right side. Sukra present in the entire body comes out when man indulges in copulation with the woman, in a happy mind[17].

## DISCUSSION

Correlation of kala in the modern science-

- Two muscles are separated by connectivetissue septum[18] and it carriesnerves and blood vessels which traverse the intermuscular septa to inter the muscles. In addition to it, the septa provides additional surface for muscular attachment. Henceintermuscular septa can be correlated with mansadharakalaanatomicaly as well as physiologicaly[19].

- The wall of an artery is made up of three concentric layers. The innermost layer is called the tunica intima[20].This layer consists of a simple squamous epithelium, thin layer of glycoprotein and the underlying subendothelial connective tissue[21]. Spleen and liver are considered as raktadharakala as the form and store the raktadhatu. As per Acharya Susruta rasa dhatu though apya (lipid, possessing the properties and action of water) after ranjan karma within the Yakrit and pliha attains red colour[22].The splenic parenchyma is made up of red and white pulp. Spleen is chief hematopoietic organ during embryonic phase whilein hepatic phase spleen produces blood cells along liver. Where as in myeloid stage, blood cells are produced by liver, spleen and bone marrow simultaneously[23].

- Fat or adipose tissue cells are found associated with loose connective tissue subepidermal areolar tissue is commonly filled with fat cells. Fat is not deposited indiscriminately over the body. It is found, primarily, as a continuous layer or as a deposition on membranes such as mesenteries or omentum[24].According to KavirajGananathSen, majja is of two kind viz. pita and rakta. Pita is found in the nalakasthi, while the rakta is found in other bones. Majjaandmeda are not dissimilar. It is the grosser from of meda. Because of their functionsmeda and majja have been treated separately. Acharya susruta mention saraktameda which is corresponding to the red bone marrow. In early childhood it was mostly of the types of red bone marrow[25]. All of the red bone marrow is replaced by

yellow bone marrow in old age[26].The composition of majja which stated above is suddhasneha, is shown by modern physiology to be the same as the composition of fats stored up in the adipose tissue present elsewhere in the body vizpalmatin, stearin and olein[27].

- Synovial membranes line the cavities of freely moveable joints.It secretes clear, oily synovial fluid, which lubricates and nourishes the joints.It is not an epithelial membrane, but instead consists of discontinuous layer of synoviocytes, a layer of connective tissue and elastic fibers[28,29].
- In parts of alimentary tract that are subject to greater wear and tear or mechanical injury, this mucous layer formed by stratified squmaous epithelium. The goblet cells which secretesmucus are present in the mucosal lining of colon and the upper region of the rectum[30]. The function of the large intestine is transmit the useless waste material from thebody and to absorb water from the remaining indigestible food matter[31]. After absorption of water and essential food and vitamin separates the fecal part. So we correlate the purishdharakala of mucosal lining of colon and rectum.
- The duodenum is the proximal segment of the small intestine. The wall of duodenum consists of four layers, the mucosa, submucosa, mucus, muscularis. The villi in this region are broad, tall, and numerous and small number of goblet cells present in the duodenal epithelium. Duodenal (Brunner's) glands with mucus secreting cells in the submucosa characterized this region. Duodenal glands secrets the digestive enzyme[32]. The bile duct and pancreatic duct come into contact at the medial side of this part of the duodenum. The ducts enter the wall of the gut obliquely through hepatopancreatic ampulla. These enzymes are helps the digestion of food. So we can correlate the pittadharakala in epithelium lining of duodenum[33].
- The seminal vesicles are convoluted pouch, lined with columnar epithelium and lying on posterior aspect of the bladder and anterior to the rectum. Each seminal vesicle opens into short duct and joins the corresponding deferent duct to from an ejaculatory duct. They pass through the prostate gland and join the prostatic urethra, carrying seminal fluid and spermatozoa to the urethra. The walls of ejaculatory duct are composed of the same layer of tissue as the seminal fluid. So we correlate the sukradharakala with mucosal lining of the seminal vesicles and ejaculatory duct[34].

**CLINICAL ASPECT OF KALA-** Kala /Membranes are the outer covering of all

organs which protects the organ. Membrane is formed by the mucous, serous, and fibrous layer which secrets the fluids, it helps to lubricate the organs and protects the friction of organs. Mucous and serous membranes are the commonest sites for inflammatory disease[35].

**Table 1** Clinical Aspect of Kala

| S.N | Kala | Clinical importance |
|---|---|---|
| **1.** | Intermuscular septum | Muscles of arm, forearm, thigh, legs are divided by the intermuscular septum. Vein, artery, nerve and ligament passes through these septum[36] so injury of septum causes the injuries of vessels, nerve, ligaments. |
| **2.** | Endothelial lining of blood vessels | Endothelial cellsregulate thrombosis, thrombolysis, platelet adherence, vascular tone and blood flow and also maintain the nonthrombogenic blood tissue interface. Endothelial cells are closely responsible in many disease processes, including atherosclerosis, hypertension, pulmonary hypertension, sepsis and inflammatory syndromes[37]. |
| **3.** | Synovial membrane | Synovial membranes are outer lining of joints, which secretes the synovial fluid. It lubricates the joints and protects the friction of bones. Inflammation and injury of synovial membrane cause diseases. |
| **4.** | Endothelium lining of elementary tract | Elementary tract is lined by the endothelial layer. In this layer present digestive glands, which secrets digestive enzyme. This digestive enzyme helps the digestion of food and endothelial lining also protects the elementary tract by the corrosive acid secretion. |
| **5.** | Mucosal lining of seminal vesicles and ejaculatory duct | Seminal vesicle ducts secrete an alkaline, viscous fluid that contains fructose, prostaglandins and clotting protein which forms 60% of the volume of semen. Its alkaline nature protect the sperm in the acidic environment of the vagina and contains fructose to fuel the sperm during their journey through the female reproductive tract[38,39]. |
| **6.** | Pleura, peritoneum, Peritoneum | These are the serous membrane lined by the lungs, heart and abdominal organs, secrete serous watery fluid. The two layers parietal and visceral layer surrounds the organs. A small amount of fluid between the two layers reduces friction, allowing the viscera to slide somewhat during movements[40,41]. |

## CONCLUSION

Kala is the important structure which performs many function like protection, lubrication of organs of the body and gives the precious knowledge about layers of body. In Ayurveda the diseases are caused only when the tissues are contaminated or vitiated by the doshas. Similarly, when Kalas are vitiated or get injured then it causes diseases and also effect the organ or structure which is enclosed in that Kalas. So kalas are very important in clinical point of view. The saptakala mentioned in ancient Samhitas of Ayurveda can be correlated with the modern science on the basis of anatomy, physiology, and clinical point of view.

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