

## ANATOMICAL INSIGHTS INTO PITTADHARA KALA- A REVIEW

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Article Received on  
07 January 2024,

Revised on 27 Jan. 2024,  
Accepted on 17 Feb. 2024

DOI: 10.20959/wjpr20245-31416



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## ABSTRACT

*Kala Shareera* is one of the unique concepts mentioned in *Ayurveda*. *Acharya Sushruta* emphasized about *Kala* in hierarchial compendiums. *Kala Shareera* is one of such topics which despite the fact is being a miniscule structure, is described with supreme authority with location, enumeration, examples and clinical utility and it gives us information about the important layers and membranes of the body. *Kalas* are the limiting membrane between *Dhatu* and *Ashaya*.<sup>[1]</sup> *Acharya Sushruta* explained about *Sapta Kala* in *Shareera Sthana*. Specific *Kalas* are located at specific sites among which sixth *Kala* is *Pittadhara kala* and it is situated between *Pakwaamashaya*. The aim & objective of this study is to compare structural aspects of *Pittadhara Kala*. All pertinent information was gathered from the *Bruhatrayi*, *Laghutrayi* and available commentaries on it and also from various research articles, previous work done. All the information collected, analyzed and finally conclusion is drawn. As per the modern science *Pittadhara*

*Kala* can be compared with mucous membrane of small intestine. Thus, precise knowledge of *Kala* helps physician to determine the disease is at which level and facilitates diagnosis at right time.

**KEYWORDS:** *Kala*, *Pittadhara Kala*, Mucosal layer, Small intestine.

## INTRODUCTION

*Sushruta Samhita* is the earliest treasure of anatomical concepts which illustrates the structures on both gross and microscopic levels. *Kala* is a unique concept mentioned in

*Ayurveda* which has been given prime importance due to various physio-anatomical and therapeutic implications. *Acharya Sushruta* explained *Kala* in anatomical sense in *Garbha Vyakarana* chapter of *Shareera Sthana*. *Kala* is defined as ‘*Dhatwashayanter Maryada*’ where *Dhatu* refers to one which does the *Sharira dharana* like *Rasa*, *Raktadi dhatu* etc. *Ashaya* refers to *Avasthana Pradesha* and *Maryada* is the *Antara* between *Dhatu* and *Ashaya*.<sup>[2]</sup> *Acharya Vaghbata* in the context of *Kala* mentioned that *Kleda* which lies in the internal part of the *Ashaya* becomes *Pakwa* by *Dhatwagni* forms *Kala*.<sup>[3]</sup> This concept is exemplified as on cutting wood its pith is observed, likewise *Dhatu*s are found dissecting the *Mamsa*. *Sapta Kala* explained in *Samhita* whereas *Pittadhara kala* is sixth, which is present in between *Pakwashaya- Amashaya*.<sup>[4]</sup>

### AIM AND OBJECTIVES

1. To collect the information from different *Ayurvedic* texts regarding the concept of *Pittadhara Kala*.
2. To collect the references from different modern texts regarding small intestine and digestion.
3. To compare structural aspects of *Pittadhara Kala*.

### MATERIALS AND METHODS

This is a conceptual study of research, and all relevant references have been gathered from a variety of classical *Ayurvedic* texts, including the *Sushruta Samhita*, *Charaka Samhita*, and *Ashtanga Hridaya*, as well as available commentaries on it. Literature is also compiled from modern textbooks for the information related to gastro-intestinal tract and digestion. Various research article searched related to *Pittadhara Kala* and its functional aspects.

### DISCUSSION

*Kala* refers to ‘*Dhatwashayanter Maryada*’ which separates *Dhatu* and *Ashaya*. As per *Astanga sangraha*, the process of formation of *Dhatu* takes place in many stages in the initial stage; *Dhatu* is in the form of liquid which is called *Dhatu Rasa*. This *Dhatu Rasa* gets converted into the next *Dhatu*. During this process, some *Kleda* remains between *Dhatu* and *Ashaya* entitled as *Dhatu Sara Shesha* which is not converted into *Purva Dhatu* or *Uttara Dhatu* is minimal in nature become *Pakwa* by *Dhatwagni* then formed as *Kala*.<sup>[5]</sup> *Snayu*, *Jarayu* and *Shleshma* are the fundamental principles involved in the formation of *Kala*.<sup>[6]</sup> *Snayu* signifies structural support, *Jarayu* signifies barrier/selective permeability, *Shleshma*

signifies lubrication and nutrition these three structures can be correlated with fibrous, serous and mucous layers respectively.

### ***Pittadhara Kala***

*Pittadhara Kala* is said to be sixth *Kala* which is situated between *Pakwashaya* and *Amashaya*. As per *Acharya Sushruta* it holds the four types of food (*Ashita*, *Khadita*, *Peeta*, *Leedha*) propelled from *Amashaya* on its way to *Pakwashaya*. Since it is the site of *Antaragni*, the food brought into this site becomes digested under the action of *Pitta Tejas* and endures the *Soshana*.<sup>[7]</sup> Similar description is mentioned in *Astanga Sangraha*.

*Acharya Sushruta* mentioned *Pittadhara Kala* as *Majjadhara Kala* in *Kalpa Sthana* in the context of *Sarpadamshta Visha Vigyanam*. After *Sarpa Damshta* the *Visha* (poison) enters from one *Dhatu* to another through *Kala* and manifest into *Vega*. It vitiates *Dhatu* and its *Kala*. The sixth *Visha Vega* penetrates *Majja dhatu* (bone marrow) through *Majjadhara kala* it deranges the *Grahani* and exhibit the symptoms like *Gaatra Gourava*, *Atisara*, *Hritpeeda*, *Murcha*.<sup>[8]</sup>

*Sharangadhara* considered *Pittadhara Kala* as *Agnidhara Kala*.<sup>[9]</sup> 5/6 and also in the context of *Aharadi gati* stated that *Grahani* situated between *Amashaya* and *Pakwashaya* is referred as *Pittadhara kala*.<sup>[10]</sup> (6/2)

*Acharya Sushruta* in *Uttaratantra* mentioned that *Grahani* itself is *Pittadhara Kala* as it is situated *Pakwa-Amashaya Madhyastha*. *Grahani* is elucidated as '*Grahanat Grahani*' which means it does the *Anna Grahana*.<sup>[11]</sup> 3/50 Followed by *Pachana karma* of *Chaturvidha anna* propelled from *Amashaya* under the action of *Pachakagni* then digested food move to *Pakwashaya* that is *Vimunchana Karma*. In case of *Durbala Grahani* undigested food is propelled into *Pakwashaya*.

*Pittadhara Kala* has not been detailed by *Acharya Charaka*, but *Grahani* has been well explained, and it is said that *Grahani* is the location of *Agni*. Hence *Pittadhara kala* is considered as *Grahani* which not only does the *Dharana karma* but also involved in *Anna Grahana Pachana*, *Vimunchana*.

*Grahani* is situated between *Pakwashaya* and *Amashaya* by this we can consider stomach (*Amashaya*) as upper limit and large intestine (*Pakwashaya*) as lower limit of *Pittadhara*

*kala*. According to contemporary science, we compare the *Grahani* with small intestine situated between stomach and large intestine where maximum digestion takes place.

*Grahani* facilitates the *Grahana*, *Pachana*, *Soshana* and *Munchana* karma.

Even though digestion begins from the oral cavity under the action of various enzymes but maximum digestion and absorption takes place in the small intestine. For this process, as large surface area is required it is achieved by presence of structures like Circular folds (plicae circularis), villi and microvilli. Small intestine is lined by layers like mucosa, submucosa, muscularis, serosa adventitia. Circular folds are permanent folds of mucous membrane begins in the second part of duodenum become large and closely set below the level of major duodenal papilla, diminishes progressively in ileum and absent in distal half of ileum similarly Villi (finger like projections) they are large and numerous in the duodenum and jejunum, but are smaller and fewer in the ileum.<sup>[12]</sup> These structures aids in retaining of chyme ejected from the stomach. This can be correlated to *Grahana Karma* of *Grahani*.

The chyme entering the small intestine contains partially digested carbohydrates, proteins and lipids. The complete digestion of these macronutrients takes place under the action of pancreatic juice, bile juice and intestinal juice.<sup>[13]</sup> The structures aids in this process are the enteroendocrine cells situated in the mucosal layer of small intestine.

Enteroendocrine cells like S cells- secretes secretin hormone which provides neutral environment as it inhibits gastric acid and increases pancreatic, biliary bicarbonate production. Pancreatic juice comprises of pancreatic amylase which converts carbohydrates into monosaccharides.

Cholecystokinin cells stimulate the pancreas to release enzymes like pancreatic lipase which aids in digestion of lipids into monoglycerides. Similarly proteolytic enzymes convert proteins into amino acids. Thus this process can be compared with *Pachana karma*.

Absorption of materials occur via diffusion and osmosis. About 90% of all nutrient absorption occurs in small intestine and only 10% in stomach and large intestine.<sup>[14]</sup> The epithelium of mucosal layer primarily comprises of absorptive cells(enterocytes) with scattered goblet cells. Enterocytes are the columnar absorptive cells responsible for absorbing water & electrolytes. Nutrients generally have to pass through enterocytes (transcellular absorption) before they reach the underlying lamina propria and its blood vessels and

lymphatics (lacteals).<sup>[15]</sup> Apart from these, the structures like circular folds, villi and microvilli assist in absorption process. Followed by absorption residual contents get desiccate this can be correlated to *Soshana Karma*.

Segmentations and peristaltic movements in intestine assist the further movement of chyme. Segmentations are localized, mixing contractions that aids in mixing of chyme with digestive juices and brings the food particle in contact with mucosa for absorption. After most of meal has been absorbed, which lessens distension of the wall of small intestine, segmentation stops and peristalsis begins. The migrating motility complex begins in the lower portion of stomach and ends in the ileum<sup>[16]</sup> with help of this any undigested or unabsorbed food material left in the small intestine passes on to the large intestine. This function can be correlated to *Munchana Karma*.

Hence the structures involved in the digestion and absorption process mainly mucosal layer of small intestine can be considered as Pittadhara kala.

## CONCLUSION

*Pittadhara kala* is located in between *Pakwashaya* and *Amashaya*. *Acharya Sushruta* in *Uttara tantra* mentions that *Pittadhara Kala* is itself a *Grahani*. As per functional aspect *Grahani* is mainly involved in digestion and absorption of food. Maximum digestion takes place in the small intestine, structures involved in this process that is the mucosal layer of small intestine can be correlated with the *Pittadhara Kala* as it exhibits the same function.

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