

CONCEPTUAL STUDY OF PURISHDHARA KALA IN RELATION TO ASTHIDHARA KALA W.R.T. Ca⁺- Na⁺ ION CHANNELS

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ABSTRACT

Kala is defined as limiting or separating membrane between *dhatu* and *ashaya*. It does *dharan* of respective dhatus and helps in their smooth functioning. *Acharya Sushrut* has described *SaptaKala* amongst which *Purishdhara Kala* is one located in *Pakwashaya*, commencing from *Yakrut* and intestine it separates *mala* from the *saar bhag* after digestion at *Unduk*. As per modern science, the smooth muscle layer of intestine contains Calcium Sodium ion channels in large number. This functions as the initiators of smooth muscle contractions of intestine. The extracellular fluid is the provider of Calcium ions. *Purishdhara Kala* can be considered as its internal layer. *Acharya Dalhan* has called *Purishdhara Kala* as *Asthidhara Kala* reasoning that as there is *saptaKala* involved in *vishavegantara* and *asthi* related symptoms are found when *visha* is in *Purishdhara Kala*. By this we can co-relate *Purishdhara Kala* with *Asthidhara Kala* and role of Calcium ion channels in *pakwashaya*.

Keywords: *Purishdhara Kala*, *Asthidhara Kala*, Calcium Sodium ion channels, *Pakwashaya*

INTRODUCTION

Acharya Sushrut has described '*Kala*' in "*Garbhav-kranti ShareerAdhyay*" giving an evidence of study of microscopic level. It is defined as *Dhatvashayantar maryada* i.e. it is a limiting membrane between *dhatu* and *ashaya*. Just like skin envelops the whole body from external environment. In the same way the internal structures of the body are covered with *Kala*, so that they can be protected and carry out their respective function. Anatomically it separates different *dhatu* and *ashayas*, whereas physiologically it does the *dharan* of its respective *dhatu*. When either of the two functions is disturbed, pathology occurs and so

for the treatment purpose study of *Kala* is important. *Acharya Sushrut* has explained *saptakala*^[1], the fifth *Kala* amongst these is "*Purishdhara Kala*", which is present inside *pakwashaya* (large intestine) separates the *mala* (waste product) from the *saar bhag* after its digestion. *Purishdhara Kala* is situated inside the alimentary tract, commencing from *Yakrut* (liver) and the intestine, this *Kala* separates the *mala* at the *unduk* (Caecum) hence it is also called as "*Maladhara Kala*". The function of Large Intestine is mainly formation, holding, and proper excretion of stool. *Purishdhara Kala* does *dharan* of *purish* for proper

time. In intestine the smooth muscle layer consists of Ca⁺ - Na⁺ ion channels which helps in gastrointestinal movements. *Dharan* of *purish* in intestine is depended on its motor function. This context consist study of *Purishdhara Kala*, explanation of verse '*Purishdhara Kala sa eva Asthidhara Kala*' and its correlation with concept of Ca⁺ - Na⁺ ion channels in intestine.

Aim and Objective

1. To explore *Purishdhara Kala*.
2. Explanation of '*Purishdhara Kala sa eva Asthidhara Kala*' with concept of Ca⁺ - Na⁺ ion channels in intestine.
3. Absorptive function of Colon and bilirubin metabolism

Material and Methods

1. Classical text of Ayurveda i.e. *Laghutrayee* and *Bruhatrayee* along with the *tika's* were taken as reference.
2. Journals, Books, Research articles, Web search was used for more precised information.

Observation

Kala is the lining membrane between *dhatu* and *ashaya* or a limiting membrane between two entites of body [2]. They provide support and protection to the organs. According to *Acharya Sharangdhar* [3] the *kleda* or moisture or liquid portion present in between *dhatu* and *ashaya* is processed by the heat of the body and converts it into *Kala*. The fifth amongst the *sapta kala* is *Purishdhara Kala* [4] which is located in *Pakwashaya* (Large Intestine) inside the *antah koshta* (Abdomen). This *Kala* is particularly located in the intestine at the level of *Yakrit* (Liver) and within the *Koshta* differentiates *mala* situated at the site of *Unduk* (Caecum). This means *Purishdhara Kala* is situated all through the large intestine but mainly in the *unduk* or caecum. It receives digested food from small intestine and *Purishdhara Kala* then separates the *saar* and *kitta bhag* and forms stool and faeces in Large Intestine. This *Kala* is also called as '*Maladhara Kala*.'

Purishdhara Kala Sa Eva Asthidhara Kala

Acharya Sushrut has not considered *Asthidhara Kala* under *sapta kala* but *Acharya Dalhan*[5] has considered *Purishdhara Kala* same like *Asthidhara Kala* . The

reason why *Purishdhara Kala* is called as *Asthidhara Kala* is made clear by following explanation-

- *Asthidhatu* is fifth amongst *Saptadhatu's*. According to *Ach. Sushrut* [6], *visha vega* are are seven because they take the *ashray* of *SaptaKala* for *Vishavegantar* and exhibits symptoms accordingly.
- In the fifth *vishavega*, when the *visha* is in fifth *Kala* i.e. *Purishdhara Kala* there is *Parwabhedha* i.e. it exhibits symptoms related *asthi dhatu* when in fifth *vegawastha*.

Acharya Kashyap has explained about *Fakka* (Rickets) in childrens, in this child is unable to stand even after completing a year. In Rickets, there is decreased absorption of calcium and phosphorus from the intestine, leading to the bending and softening of bone. Large intestine contains large number of Ca⁺ - Na⁺ ion channels, which takes up Calcium from the extra cellular fluid.

In Ayurveda, *basti* is given via rectal route, so in this way *basti* nourishes the *asthivaha srotas* and thereby treats *vataj vikars* and *asthi dhatu kshay*. From the above discussion, the term *Asthidhara Kala* appropriately suits to *Purishdhara Kala*.

Ca- Na ion channels of Large Intestine

According to modern science, the nature of *mahasrotas* i.e. GIT is made up of four layers- Mucosa, Submucosa, muscular, serous or fibrous layer. This can be co- related with the *Purishdhara Kala* and can be attributed as Gastrointestinal Tract. [7][8] Smooth muscles of GIT are situated in muscular layer and few in deeper layer of mucosa. The contractile process in smooth muscle is activated by Ca⁺ ions. The smooth muscle cell membrane has more Ca⁺ channels than skeletal muscle but few sodium channels. Therefore, sodium participates little in the generation of action potential in most smooth muscle. Flow of calcium ion to the anterior of fibre is main cause of action potential. Almost all the Ca⁺ ions that causes contraction enter the smooth muscle cell from the extracellular fluid at the time of action potential.

Absorptive function of Colon and Bilirubin Metabolism

- Colon has one of the functions of water absorption and immunity. The chyme entering colon is already concentrated as most of the water has already been absorbed, the colon must work against a large osmotic pressure gradient than rest of Gastrointestinal Tract^[9].
- Colon helps to absorb small volume of water from lumen. It transports ions; nutrients released by Gut bacteria and dissolved in water are also absorbed in Large Intestine and used for body metabolism.
- **Bilirubin Metabolism**^[9] - Conjugated bilirubin is metabolized by colonic bacteria to form stercobilinogen, which may be further oxidized to stercobilin. Both stercobilinogen and stercobilin are then excreted in the stool. A small amount of stercobilinogen (4mg/day) is absorbed from bowel, passes through liver and is excreted in the urine, where it is known as urobilinogen following further oxidation, urobilin.

Co-relation of Purishdhara Kala with Ca- Na ion channels of intestine

Purishdhara Kala is situated in *pakwashay*, which starts from *Unduk* i.e. Caecum. In gastrointestinal smooth muscle fibres, the channels responsible for action potential allow large number of calcium ion to enter along with small number of sodium ion, hence called as Ca⁺ - Na⁺ channels.

The movement of large amount of Ca⁺ ions to the interior of the muscle fibre during the action potential plays a special role in causing the intestinal muscle fibre to contract. Calcium is *parthiv dravya*. It can be considered as one of the components of *asthi dhatu*. As told earlier, Ca⁺ - Na⁺ ion channels are necessary for the functioning of intestine, these channels do *Dharan* of *asthi dhatu* for appropriate time, so this can be said as *Asthidhara Kala* of *Pakwashay*.

DISCUSSION

Kala is a limiting membrane between *dhatu* and *Ashaya*. *Purishdhara Kala* is situated all over *Pakwashay*, but especially in *unduk* where it differentiates *mala* situated at site of *Unduk* i.e. it does *mala*

vibhajan. The Ca⁺ - Na⁺ ion channels, necessary for the motor functioning of the intestine, present in the intestinal layer can be co-related to *Asthidhara Kala* of *Pakwashay*. This can be well understood by *vishavega* that take the *ashray* of *Sapta Kala* for *Vishavegantar* specially in fifth *vishavega* the *visha* is in fifth *Kala* i.e. *Purishdhara Kala* there is *Parwabhedha* i.e. it exhibits symptoms related *asthi dhatu*. This throws a light on the verse '*Purishdhara Kala sa eva Asthidhara Kala*'. Function of *Purishdhara Kala* can be compared with absorptive function of colon and Bilirubin Metabolism. In gastrointestinal smooth muscle fibres, the channels responsible for action potential allow large number of calcium ion to enter along with small number of sodium ion, hence called as Ca⁺ - Na⁺ channels. Ca⁺ - Na⁺ ion channels are necessary for the functioning of intestine, these channels do *Dharan* of *asthi dhatu* for appropriate time, so this can be said as *Asthidhara Kala* of *Pakwashay*.

CONCLUSION

Due to the symptom of *Parwabhed* in fifth *vishavega* i.e. when the *visha* is in *Purishdhara Kala* it depicts symptoms of *Asthivaha srotas*, hence *Purishdhara Kala* is called as *Asthidhara Kala*. Ca - Na ion channels of intestine are necessary for the functioning of intestine, these channels do *dharan* of *asthi dhatu* for appropriate time. Function of *Purishdhara Kala* is compared with absorptive function of colon and Bilirubin Metabolism. *Asthidhara Kala* is co-related with Ca - Na channels containing layer of Colon.

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