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## Review Article

### A CRITICAL STUDY OF *MEDODHARA KALA* AND ITS CORRELATION WITH ADIPOSE TISSUE

Vaishali T. Ganvir<sup>1</sup>, Prachi S. Sawsakade<sup>2\*</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>PG Scholar, Dept. of Rachana Sharir, Bhausaheb Mulak Ayurved Mahavidyalaya, Nandanvan, Nagpur, Maharashtra, India.

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#### ABSTRACT

There are many concepts mentioned in the classics are scientific and worth understanding in modern words. Every concept of *Ayurveda* has its own importance. Among them *Acharya Sushruta* explained *Sapta Kalas* in the body which mainly separate *Dhatu* and *Ashaya*. *Kala Sharir* is an important part of an *Ayurvedic* anatomy. *Kala* means layers or membranes of our body. There are many layers or membranes in the body which form an envelope over the organs. They provide support and protection to the organs. *Medodhara Kala* is 3<sup>rd</sup> in position and is described by *Sushruta* and other *Acharyas*. *Medadhatu* (adipose tissue or fat) is one of the seven fundamental tissues (*Saptadhatu*). It provides warmth, lubrication and oiliness to the body. Fat protects the body and leads strength, sturdiness and stability to the organs. It helps to nourish the *Asthidhatu*. Adipose tissue or fat is an anatomical term for loose connective tissue composed of adipocytes. Its main role is to store energy in the form of fat, although it also cushions and insulates the body. In this way we can understand the *Medodhara Kala* in gross anatomy. So the collection and comprehensive review of information regarding *Medodhara Kala* in different resources and its structure and function becomes significant.

#### INTRODUCTION

*Kala* is an important part of an *Ayurvedic* anatomy. This concept is explained by *Acharya Sushruta* in *Sushrut Samhita* in *Garbha - Vyakaranam Shariram adhyaya* i.e. Embryology. *Kala* means the layers or membranes in the body which forms an envelope over the organs. They provide support and protection to the organs. There are seven *Kalas* are present in the body and situated at extreme borders of different fundamental principles (*Dhatus*) of organism.<sup>1</sup> *Kalas* are explained in embryonic life, they are found to be functioning throughout the life. The concept of *Kalas* are also found in *Sarpavega Chikitsa Adhyaya of Kalpasthan* during the treatment of snake bite. So we can assume that *Kalas* are present and functioning in the body from the birth till to the death. As the duramen or core of a piece of wood or stem becomes exposed to view by cutting into it, so the root principles (*Dhatus*) of the body may be seen by removing the successivelayers or tissues of its flesh. These *Kalas* are extensively supplied with

*Snayus* (fibrous tissue) bathed in mucous and encased in membranous covering.<sup>2</sup>

#### AIM AND OBJECTIVE

##### AIM

To study the *Medodhara Kala* and its correlation with adipose tissue.

##### OBJECTIVE

1. To study the concept of *Medodhara Kala* according to *Ayurveda*.
2. To correlate the *Medodhara Kala* with adipose tissue.

#### MATERIALS AND METHODS

During the study of *Medodhara Kala* and its correlation with adipose tissue different *Samhitas* with their commentaries by different authors were referred. References from modern text book, articles, web pages also used to correlate the concept of *Medodhara kala* as adipose tissue.

### Definition of Kala

|| *Kala khalwapi sapta bhawanti dhatwashayanter maryada*|| *Su. Sha. 4/5*

The development and formation of body are going on by these *Kalas*. The *Dhatu*s and *Malas* are formed by the *Kalas* which are minute and invisible in the body. The *Kalas* are extremely minute particles invisible to the naked eyes, as are the cells in the human body. The *Kalas* are limitation of the *Dhatu Nirmat Aashay*. Thus we can say that separation of *Dhatu* and *Aashay* i.e. covering between *Dhatu* and *Aashay* is *Kala*.<sup>3</sup> The commentator *Indu* in his commentary describes *Dhatwashay* as the *Strotas*.<sup>4</sup>

The process of formation of *Dhatu* takes place in many stages. In initial stage, *Dhatu* is in the form of liquid which is called as *Dhaturasa*. This *Dhaturasa* get converted into next *Dhatu*. During this process some *Kleda* remains between *Dhatu* and *Aashay*. This *Kleda* i.e.

*Dhaturasa shesh* or *Vishesh* is not converted into *Purva dhatu* (previous *Dhatu*) or *Utterdhatu* which is remain in very less quantity; due to minimum quantity they are called as *Kala*.<sup>5</sup> Hence we can consider that *Kalas* are one of the most essential parts of the *Dhatu*. The activity or functions of *Kalas* results into the formation of *Dhatu*s.<sup>6</sup>

### Medodhara kala

The third *Kala* is called as *Medodhara* (Adipose tissue). *Meda* (fat) is present in abdomen of all animals as well as in the cartilage (small bones). The fatty substance present in large bones is called *Majja* (Marrow).<sup>7</sup> It acts as lubricants and provides protection to the underlying structures.

### Functions of meda

1. "*Sneha (Medasa shreshtham karma)*" (*A. Hru. Su. 11/4*)

The most important function of *Meda* is formation *sneha* (oiliness) to all body organs.

2. "*Meda sneha swedau drudham pushtim asthyanam ch |*" (*Su. Su. 15/5*)

Second function of *Meda* is *Uttar Dhatu Pushti* means *Asthi Dhatu poshan*.<sup>8</sup>

The waste products produced by formation of *Meda dhatu* are the skin secretions of sweat.

### Psychology and Meda dhatu

*Meda dhatu* refers to the fatty tissue of the body. In the physical body *Meda dhatu* relates to sebum (skin oil) and greater-lesser omentum which are its *Upadhatu*. These tissues are the primary storage sites for excess body fat in the abdomen.

*Meda dhatu* is formed as *Poshak Mansa dhatu* flows into the *Medodhara Kala* and digested by the *Medagni*. The waste products produced by formation of *Meda dhatu* are the skin secretions of sweat and sebum. *Meda dhatu* is built primarily from the water element (*Jal Tatva*) and secondarily from the earth (*Pruthvi Tatva*). The presence of water reveals nourishing nature of fatty tissue and presence of earth reveals its role in stabilizing the functions of body and mind. In order to produce healthy *Meda dhatu* adequate earth and water must be consumed through the diet. Consumption alone does not guarantee that healthy *Meda* will be formed. These two elements must properly digested so that their qualities can be used to built body fat. Thus, *jatharagni* (main digestive fire) must be healthy. If it is not healthy, rather than forming healthy *Meda dhatu*, these same foods will produce *Ama* and toxify the body and mind.

### Pathology and meda dhatu

- When *Vata* vitiates the *Medhovaha Strotas* and *Medodhara Kala*, the *medagni* become variable. The qualities of water and earth that have been consumed are irregularly digested less *Meda dhatu* is produced and it is of poor quality. There is weight loss, body become dry, fragile, hard and depleted. Poor quality of tissue produced contributes to irregular deposits of fat with walls of arteries, mind and body become hard.
- When *Pitta* vitiates the *Medhovaha Strotas* and *Medodhara Kala*, the *medagni* become too high, as a result the quantities of earth and water are burned up quickly, leading to little *Meda* production. The *Meda* that is produced is of high quality but it is simply not enough to provide protection, stability and deep nourishment. This result in weight loss, body become dry, fragile, hard and depleted.
- When *Kapha* vitiates the *Medhovaha Strotas* and *Medodhara Kala*, the *medagni* become low, as a result the quantities of earth and water taken into body are digested slowly causing a greater amount of fatty tissue to form which is of low quality. While excess quantity produces weight gain, low quality clogs the channels of body, obstructs the motion, stagnates circulation and leads to greater emotional attachments.

### Evaluating the meda dhatu

- When *Meda dhatu* is healthy, the body has an appropriate amount of body fat, the skin and the hair are neither too oily nor dry and the voice is melodious and soft.

- Excessive *Meda dhatu* reveals itself as excessive soft tissue, particularly in the abdomen. In addition skin and hair will be excessively moist and oily and the voice may become obstructed by oily plegm.
- Deficiency of *Meda dhatu* reveals minimal body fat exposing the articulation of the body and ribs. The face may appear gaunt. Skin and hair will be dry and these may be deep cracks over the lips and on tongue. Voice may crack often or become piercing, whiney or high pitched.

#### Adipose tissue or fat

- Adipose tissue is basically an aggregation of fat cells also called adipocytes. It is found subcutaneously throughout the body except over the eyelid, auricle, penis and scrotum. This subcutaneous layer of fat is called panniculus adiposus.<sup>9</sup>
- In addition to adipocytes, adipose tissue contains the stromal vascular fraction of cells including preadipocytes, fibroblasts, vascular endothelial cells such as adipose tissue macrophages.
- Far from being hormonally inert, adipose tissue has in recent years, been recognized as major endocrine organ, as it produces hormones such as leptine, estrogen, resistin and cytokine.<sup>10</sup>
- Fat is present around many abdominal organs, specially the kidneys is called perinephric fat.<sup>11</sup>

#### Types of adipose tissue

1. Yellow or White or Unilocular Adipose Tissue (adult type) which stores the energy.
2. Brown or Multilocular Adipose Tissue (embryonic type) which generate the body heat.<sup>13</sup>

#### Functions of adipose tissue

1. It acts as store house of nutrition, fat being deposited when available in excess and being removed when deficient in diet.
2. In many situations fat performs a mechanical function. Fat around kidneys keep them in position, if there is sudden depletion of this fat kidneys may become mobile (floating kidney).
3. In palm, sole and over buttocks fat has cushioning effect protecting underlying tissue from pressure.
4. Fat around the eyeball helps to move smoothly.
5. The subcutaneous fat has been regarded as an insulation against heat loss and would certainly perform this function if the layer of adipose tissue is thick. Hence feel less cold than boys at the same temperature.

## RESULT AND DISCUSSION

*Kalas* are covering between the *Dhatu* and *Aashaya*. They can be recognized by their structures and functions in the body. *Kalas* are one of the essential part of *Dhatu*. The activity or functions of *Kalas* results into the formation of *Dhatu*s. *Sapta Kalas* are widely explained by *Acharya Sushruta* along them *Medodhara Kala* is third in position. *Meda* can be understood as fat or adipose tissue present in the abdomen of all the animals and cartilage (small bone). The fatty substance present in large bones is called as *Majja* (marrow). It act as lubricant and provides protection to underlying structures. According to *Ayurveda* main function of *Meda Dhatu* is *Snehan*. The main roll of adipose tissue is to store the energy in the form of lipid function to the organs in the body. So according to modern point of view the adipose tissue or fat which stores the energy and generate the heat in the body and supports, protects the organs, it has to be understand as *Medodhara Kala*. There are two types of adipose tissue. They are Yellow or adult type and Brown or embryonic type, Brown adipose tissue is abundant in the newborn but most of it is lost during childhood. So by this we can understand the *Medhodhara Kala* in gross anatomy i.e. fat or adipose tissue.

## CONCLUSION

*Kalas* are specialized lining limits of organs and the system in the body. *Medodhara Kala* is considered as adipose tissue or fat is an anatomical term for loose connective tissue composed of adipocytes. In the form of adipose tissue it provides a store of nutrition. In cold weather the fat provides insulation and helps to generate the heat in the body.

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**\*Address for correspondence**

**Dr.Prachi S.Sawsakade**

PG Scholar,

Department of Rachana Sharir,

Bhausahab Mulak Ayurved

Mahavidyalaya, Nandanvan,

Nagpur, Maharashtra, India.

E-mail: [prachi2586@gmail.com](mailto:prachi2586@gmail.com)