A CRITICAL STUDY OF MEDODHARA KALA AND ITS CORRELATION WITH ADIPOSE TISSUE
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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 3rd 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. 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.

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 Dhatus 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 Dhatus and the Malas. Thus we can say that the separation of Dhatus and Malas i.e. covering between Dhatus and Malas is Kala.\(^3\) The commentator Indu in his commentary describes Dhatwashay as the Strotas.\(^4\)

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

Dhaturasa shesh or Vishesh is not converted into Purva dhatus (previous Dhatus) or Utterdhatus which remain in very less quantity; due to minimum quantity they are called as Kala.\(^5\) Hence we can consider that Kalas are one of the most essential parts of the Dhatus. The activity or functions of Kalas results into the formation of Dhatus.\(^6\)

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).\(^7\) 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 (oilyness) 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.\(^8\)
   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 which 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 excessive 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.
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.

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.

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 Dhatus. 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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