

## FUNCTIONAL ANATOMY OF MEDOVAHASROTAS IN REFERENCE TO OBESITY

Behera Sunita<sup>1</sup>, Chanana Amrish<sup>2</sup>

<sup>1</sup>PG Scholar, <sup>2</sup>Assistant Professor,  
Dept. of Rachana Sharir, Ch. Brahm Prakash Ayurveda Charak Sansthan, New Delhi, India

Email: [sunita.behera72@gmail.com](mailto:sunita.behera72@gmail.com)

### ABSTRACT

The human body is a conglomeration of the *Srotas*. It is defined as the channel which continuously secretes, transport dhatus & excretes waste product from the body. These channels are those carrying *Prana*, *Meda* etc. One of them is *Medovaha Srotas*. The distribution of adipose cells in human body is prevalent in subcutaneous tissue, omentum, kidney, skeletal muscles, liver and this reconfirms the *Moolasthan* of *Medovaha Srotas* (*Vrikka*, *Vapavahan*, *Kati*) described by Charak and Sushruta. The vitiation of this *Srotas* can lead to *Sthaulya*, *Prameh* etc. Obesity can be defined as an excess of body fat. The fat in the adipose tissue is derived from two main sources that is from food fat, carbohydrate & protein. Adipose cells are actually responsible for converting carbohydrate in to fat cells. Fat is stored as neutral fat in the adipose cell of the fat depots. After fat metabolism, more than 95% of ingested fat is absorbed, only 5-6% is excreted in stool. The excessive intake of food, sedentary lifestyle, neuro endocrinogenic abnormality and genetic predisposition are leading causes of obesity. The mutation of MCR-4 gene, leptin gene, and leptin receptor are the monogenic causes of obesity discovered so far.

**Keyword:** *Medovaha Srotas*, *Sthaulya*, Obesity, Leptin receptor, Adipose tissue

### INTRODUCTION

*Srotas* is defined as the channels/pores which continuously secretes, transport nutrient dhatus & excrete waste product from body.<sup>1</sup> The human body is a conglomeration of *Srotas* “*Api Cha Eke Srotosameba Samudayam Purushamichanti*”<sup>2</sup>

*Srotas* are also responsible for transportation of *Doshas*. The equilibrium of *Doshas* keeps our body in the state of normalcy but the exaggerated *Dosha* vitiates the *Srotas* and leads to development of diseases.<sup>3</sup> The knowledge of *Srotas* is very essential as it is responsible for carrying & transformation of tissue elements there by maintaining the health. These channels carry *Prana*, *Uadaka*, *Anna*, *Meda* etc.<sup>4</sup> One of them is *Medovaha Srotas*. Ayurveda has giv-

en prime importance to *Medovaha Srotas* and its diseases. *Meda dhatu* is the predominant *Dushya* in most of the *Santarpanajanya Vyadhi* like *Prameha* and *Sthaulya*,<sup>5</sup> and there is high prevalence of these diseases in developed as well as developing countries in present time. Each *Srotas* has a *Srotomula*, *Srotomarg* and a *Sroto Mukha*. The *Moola Sthan* of *Medovaha Srotas* described by scholars of Ayurveda is *Vrikka*, *Vapavahan*<sup>6</sup> and *Kati*.<sup>7</sup>

**Material and Methods:** - Many Ayurvedic Samhitas, Modern Books have been referred to collect the literature.

The collected literature from different sources has been analyzed to justify the *Moola Sthana* of

*Medovaha Srotas* and also to justify the *Bijasvabhava Sthaulya* according to modern science.

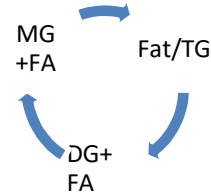
**Vitiation of Medovaha Srotas:-** Absence of physical activity, day sleep, excessive fatty diet, food which increase *Kapha* and wine of *Varuni* type are some of the risk factors that vitiates the *Medovaha Srotas*<sup>8</sup> and vitiation of *Medovaha Srotas* leads to manifestation of eight types of socially unfit body like *Atisthula*, *Atikrusha*, *Atiloma*...etc.<sup>9</sup> while the injury to *Moola* of *Medovaha Srotas* develops excessive sweating (*Swedaangamanam*), oily appearance of body (*Snigdha Angatta*), dryness of palates (*Taalu Sosha*), obesity (*Sthulata*), oedema (*Shophatta*) & thirst (*Pippasa*).<sup>10</sup> Excessive increase of *Medodhatu* produces obesity (*Sthulata*), premonitory symptoms of diabetes, unctuousness of the body, fatigue, increase of abdomen, flanks & breasts, cough, dyspnoea, bad smell etc.<sup>11</sup>

**Fat metabolism:** - Fat stores as neural fat (triglycerides) in the adipose cell of our body and is derived from fat in the diet and the fat converted from excessive intake of carbohydrate and protein. White and Brown are the two types of adipose tissue in our body, White is the biggest store of energy scattered throughout the body and helps in maintenance of FFA (free fatty acid) concentration in the blood, whereas Brown adipose tissue is found only in infants having higher metabolic rate as compared to white adipose tissue.<sup>12</sup>

Triglyceride (Neural fat), phospholipids, cholesterol and few others are the forms of fat in the food and are classified under Lipids. Chemically, the basic lipid moiety of the triglyceride & the phospholipids is fatty acid while the cholesterol doesn't contain fatty acid; its sterol nucleus is synthesized from portions of fatty acid molecules, thus giving it many of physical & chemical properties of another lipid substance. The triglycerides are used mainly to provide energy for different metabolic process where as cholesterol and phospholipids are used to form the membrane of all body cell.<sup>13</sup>

**Digestion of fats-** Some hydrolysis of neutral fats takes place during cooking. 30% of dietary triglycer-

ide is digested by salivary lipase, rest is digested by the action of pancreatic lipase and bile salts in small intestine while Gastric lipase is a weak fat splitting enzyme, so fat digestion in stomach occurs only in exceptional circumstances.



(Here TG-Triglyceride, DG-Diglyceride, MG-Monoglyceride, FA-fatty acid) with action of lipase.

**Absorption of fat:** - Most of fat is absorbed in the upper part of the small intestine and small amounts are from ileum. Movement of villi, compress the lacteal & villus capillaries this increase the mobilization of lipid towards the thoracic duct & portal vein respectively while Cholesterol likes short chain fatty acid is directly absorbed into the lymphatics. On a moderate fat intake more than 95% of the ingested fat is absorbed, only 5-6% is excreted through stool. The part of the fat absorbed in blood is in form of VLDL, LDL, HDL & rest of the fat is stored in adipose cell of fat depots as triglyceride.<sup>14</sup>

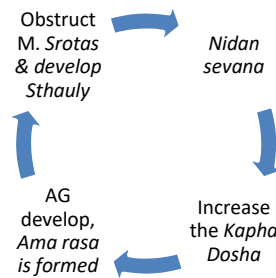
**From carbohydrate and protein-** By lipogenesis most of sugar are converted into body fat if they aren't used as energy after they are consumed similarly excess protein isn't used to build muscle rather it is used for non-protein bodily function & is stored as body fat.

**STHAULYA/Obesity:** - It is a *Santarpanjanya Vyadhi* which occurs due to the vitiation of *Medovaha Srotas*.

**NIDAN:** - It is found that dietary factors, lifestyle factors, psychological factors and genetic factors all are responsible for *Sthaulya*. Food rich in carbohydrate (ghee, oil, newly harvested rice and fresh wine), sedentary lifestyle (lack of exercise, day sleep) and psychological factors (lack of mental exercise) causes obesity. The maternal genetic factors (*Matrija Bija*) is responsible for formation of *Medo*

*Dhatu* and the excessive *Medo Dhatu* is formed by defective genetic material, this is referred as

*Bijasvabhava* in Ayurveda<sup>15</sup>



(In above diagram AG- *Agnimandya*, M. Srotas-*Medovaha Srotas*)

Above risk factors causes obstruction in *Medovaha Srotas* leading to development of *Sthaulyata* (obesity) characterized by making the person incapable of various activities, difficulty in breathing, breathlessness, bad smell of body, excessive hunger, poor physical & sexual capacity etc.

**OBESITY:** - It is defined as an excess of adipose tissue in our body mainly due to dietary imbalance

& over nutrition that imparts the health risk. The most widely used method to gauge obesity is body mass index (BMI) which is equal to weight in kg/height in m<sup>2</sup>. A BMI between 25 & 29.9kg/m<sup>2</sup> is called over weight and a BMI greater than 30kg/m<sup>2</sup> is called obese, which is associated with increased adipose stores in subcutaneous tissue, skeletal muscle, and internal organs such as kidney, omentum, and heart, liver. Each 9.3 calories of excess energy stores approximately 1gm of fat.

**Table 1:** Causes:

In modern	According to Ayurveda
1. Greater energy intake than energy expenditure, Childhood overnutrition, Smoking	( <i>Aharajanya hetu</i> )
2. Decreased physical activity & abnormal feeding regulation	( <i>Viharajanya hetu</i> )
3. Environmental, Social & psychological factor contribute to abnormal feeding (it seems that eating can be means of releasing tension)	( <i>Manasik hetu</i> )
4. Neurogenic abnormality (lesion in the ventromedial nuclei of hypothalamus causes hypothalamic obesity), genetic factor (1. Mutation of MCR-4, 2. Congenital leptin deficiency, 3. Mutation of the leptin receptor)	( <i>Bijasvabhava, Garbhapoghatkar bhava</i> )

Generally, adipocytes are fat storing cell & these cells release leptin (energy regulatory hormone), cytokines, angiotensinogen.

Increased fat deposition in body stimulates leptin synthesis → Increase in plasma leptin concentration → Stimulation of hypothalamus (increased acti-

vation of leptin receptors) → decrease in food intake & increase in energy expenditure.

It also controls the size of body fat depots. Therefore, any defect in the leptin receptor genes result in obesity.<sup>17</sup>

**Table 2:** Complication of obesity: -

In modern	In Ayurveda
Type-2 diabetes mellitus	<i>Pramehaanaam Purbarupani</i>
Breathlessness	<i>Kasasvasaadin</i>

Infertility	<i>Kucchrabyabaayata</i>
Osteoarthritis	<i>Vatajanya Roga</i>
Pregnancy complications	<i>Bijasvabhava</i>
Socially: disability on low income...etc.	<i>Daaurbalya, Sukumarata</i>

## CONCLUSION

As tree is seriously affected by injury to its root, similarly channels of circulation in human body are seriously affected when their *Moolastana* is affected. Our Acharya have described the *Moolasthanana* of *Medovaha Srotas* as *Vrikka, Kati & Vapavahan* because mainly adipose tissue is stored in kidney, omentum, liver & subcutaneous tissue of abdomen and flanks...etc. so fat deposition is mainly found in this region due to vitiation of this *Srotas*.

The risk factors of obesity described by ancient scholars of Ayurveda are very much similar to the factors found in modern science; moreover mutation of leptin receptor and congenital deficiency of leptin may be the reason behind *Bijasvabhavaj Sthaulya* (genetic obesity).

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