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## CONCEPTS OF METABOLIC DISORDERS IN *AYURVEDA W.S.R TO MEDOROGA*

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### ABSTRACT

In present era, metabolic disorders are a global medical health problem and obesity is the most common among them. *Ayurveda* explains metabolic disorders as *Agnivaishamya* (Improper digestion & absorption). *Agni* is responsible for the conversion of *Ahara* into energy. Faulty diet and life style is the chief culprit for disruption of metabolism. *Meda Dhatu* is very important as it plays a significant role in developing various metabolic disorders like Obesity which is already mentioned in *Ayurveda* as *Sthaulya/Medoroga*. The disturbance in *Medo Dhatu* metabolism is very common in present era because of increased consumption of junk foods, carbonated beverages, sweets associated with westernization. Growing prevalence of obesity worldwide is an increasing concern surrounding the rising rates of Diabetes, Coronary and Cerebrovascular disease with the consequent health and financial implications for the population. Some conditions are life threatening in the later stage/ uncontrol condition.

**KEYWORDS:** *Sthaulya, Medoroga, Ayurveda, Agni, Agnivaishamya*

### INTRODUCTION

Any of the diseases or disorders that disrupt normal metabolism, the process of converting food to energy on a cellular level is considered as Metabolic disorders. It is one of the major problems with aging that leads to several health complications. The major risk for metabolic disorder includes the consumption of unhealthy diet, a sedentary lifestyle, lack of exercise etc. Metabolic disorders such as Obesity, Diabetes Type 2 and Inflammatory Bowel Diseases are the most prevalent globally. Obesity is widely regarded as a pandemic with potentially disastrous consequences for human health. Growing prevalence of obesity worldwide is an increasing concern surrounding the rising rates of Diabetes, Coronary and Cerebrovascular disease with the consequent health and financial implications for the population.<sup>[1]</sup> It also promotes a cascade of secondary pathologies including Diabetes, Hypertension, Dyslipidaemia, Thrombosis, and Obstructive Sleep Apnoea.<sup>[2]</sup> It is a leading preventable cause of death worldwide, with increasing rates in adults and children.<sup>[3]</sup> It is more common in women than in men.<sup>[4]</sup> In 2021, As per World Health Organization it is estimated that obesity caused at least 2.8 million deaths annually.<sup>[5]</sup> The Framingham Study demonstrated that 20% excess over

desirable weight should be considered obesity as this excess weight imparts a health risk.<sup>[6]</sup> (page 722 Ref SN Chugh).

In the modern world, obesity has emerged as a serious health issue in both developed and developing nations and is recognized as one of the most serious public health problems of the 21st century. In Ayurvedic context, *Atisthaulya/ Medoroga* can be correlated with obesity. Obesity is a condition in which there is an excessive amount of fat deposit in body tissue. The disturbance in *Medo Dhatu* metabolism is very common in present era because of increased consumption of junk foods, carbonated beverages, sweets associated with westernization. Socioeconomically it is frequently seen in persons with sedentary lifestyles because it makes the human beings more comfortable. As per *Acharya Charaka Atisthaulya* is considered as one of the eight despicable conditions. He described definition of *Atisthaulya* as -A person in whom there is excessive accumulation of *Meda* and *Mamsa* leading to flabbiness of hips, abdomen, and breast.<sup>[7]</sup> *Acharya Sushruta* also mentioned that *Ahara Rasa* is the main reason for *Sthaulya* and *Karshya*.<sup>[8]</sup> (*Rasa nimittameva sthaulyam karshyam ch*). A special chapter on *Medoroga* is described in *Bhavaprakash*<sup>[9]</sup> and *Yogaratanakara*<sup>[10]</sup>.

## CONCEPT OF MEDOROGA

The term *Medoroga* was first used by *Acharya Madhava* which means a disease in which *Medodhatu* is deranged.<sup>[11]</sup> The word *Sthaulya* is derived from *mula dhatu* “*Sthu*” with edition of “*Ach*” *pratyaya* which means to grow or increase in size. *Acharya Charaka* has described *Sthaulya* as excessive increase in quantity of *Meda* and *Mamsa Dhatu* leading to pendulous movements of *Sphika*, *Udara* and *Stana*. A person with heaviness and bulkiness of body with excessive growth especially in abdominal region is known as “*Sthula*” and the disease considered as “*Sthaulyata or Medoroga*”.

In *Ayurveda Meda* also considered as prime *Dushya* in context of different diseases like- *Prameha*, *Medoroga* (*Sthaulya*) etc. In the Metabolic Syndrome, the abnormal *Meda*, when deposited into subcutaneous tissue, it gives the clinical presentation of Obesity and similarly when *Abaddha Meda* extracted to *Basti* it creates the manifestations of *Prameha*.<sup>[12]</sup> When this *Meda* is unnaturally deposited in the arterial wall and increase the peripheral resistance (*Dhamnipratichaya/arteriosclerosis*), it shows clinical manifestation like Hypertension and when these unnatural *Meda* present in the *Rakta-vaha srotas* leads to increased level of unwanted fat (Hypercholesterolemia).

**MEDA DHATU:** The word *Meda* is derived from *Sanskrit* that mean to lubricate, oleate or to apply oil or to provide unctuousness. Synonyms of *Meda Dhatu* are *Mamsatejasa*, *Asthikrit*, *Vapa*, *Vasa*, *Goda* and *Gautam*. It is formed as, *Poshak Mamsa Dhatu* flows into the *Medodhara Kala* and is digested by the *Meda Agni*. *Meda Dhatu* is the unctuous *Dhatu* like Ghee. In the existence of *Panchmahabhoota*, *Prithvi Mahabhoota Meda* is *Jala* and predominant *Dhatu*. In the metabolism of *Meda Dhatu*, *Snayu* (ligament) in the form of *Updhatu* (secondary tissue) while *Sweda* as *Mala* (excreted) part is produced.<sup>[13]</sup> *Meda Dhatu* is supported by *Kapha Dosha* due to having *Ashrya-Ashrayi Bhava*. According to *Acharya Sushruta*, time required for the formation of *Meda Dhatu* is 15 days. However, *Acharya Charaka* opines that the *Meda dhatu* is formed on the 4th day from the nutrient fluid (*Ahara rasa*).<sup>[14]</sup> In classics, there are two types of *Meda Dhatu* are described:

1. *Poshya Medadhatu (Baddha meda)*- which is fixed & stored in the form of fat at various sites in the body. This form is responsible for the nutrition of *Medadhatu* itself in case of starvation.
2. *Poshaka Medadhatu (Abaddha meda)*- which is circulating in the body along with the blood in the form of lipids (Cholestrol, Triglycerides, LDL, HDL & VLDL). It is free and unbound. This provides lubrication and unctuousness wherever needed.

## CAUSES OF MEDOVRIDDHI

The channels of transportation and transformation of *Medadhatu (Medovahasrotas)* are affected by the sedentary lifestyle including lack of physical exercise, daytime sleep, excessive consumption of fatty food, and alcoholic drinks.<sup>[15]</sup>

**MEDADHATU VRIDDHI LAKSHANA** <sup>[16]</sup>

An excess of *Medadhatu* in the body imparts an oily gloss to the skin. The sides of the abdomen are increased in bulk, and the body emits a fetid smell, and the person is assailed with cough and dyspnoea.

**NIDAN OF MEDOROGA** <sup>[17]</sup>

*Acharya Charaka* mentioned mainly eight causes i.e.,

- *Ati Sampurana* (Excess eating),
- Excessive *Guru* (Heavy), *Madhura* (sweet), *Sheeta* (cold), *Singdha* (fatty) foods in diet,
- *Avyayama* (lack of physical work),
- *Avyavaya* (Abstinence from sexual intercourse),
- *Diwaswapna* (sleeping during daytime),
- *Harshanitya* (uninterrupted cheerfulness),
- *Achintana* (lack of worries)
- *Beeja svabhava* (hereditary)

In *Ayurvedic* classical text *Sthaulya* is described as *Shleshma nimitaja Vyadhi*.<sup>[18]</sup> So *Kapha* is main *Dosha* in pathogenesis of the disease. The causes of *Medoroga* can be also explained as follows:

1. Dietary causes like excessive *Madhur*, *Sheeta*, *Guru Ahara*, *Shleshma dravya Ahara*, overeating, Frequent eating, *Adhyasayan*, *Ati Med Ahara* and *Ati Madya sevan*, excessive bakery products, junk foods etc.
2. Behavioural causes like lack of exercise, daytime sleeping, lack of thinking, exhilaration and sedentary habits.
3. Genetic or Hereditary Factors: These factors play important role in the development of *Medoroga* (*Sthaulya*).<sup>[19]</sup>
4. Improper Therapeutic Application: *Santarpana* (weight gain therapy) may give to *Medoroga* (*Sthaulya*).<sup>[20]</sup>

**SAMPRAPTI (PATHOGENESIS)** <sup>[21]</sup>

If an individual frequently consume *Shleshmala* diet such as *Madhura*, *Guru*, *Sheeta Ahara* without undertaking adequate physical activity and sleeps for a long time in a day leading to vitiation of *Kapha dosha*. The vitiated *Kapha* disturbed *Agni* that produce *Ama* in the body. This *Ama* goes directly to *Meda Dhatu* & leads to increase and accumulation of *Meda* by creating *Medodhatwagni-mandya*. Vitiated *Kapha* & *Meda* causes *Medovaha Sroto Sanga*, leading to *Margavrodha* of *Vata*. So *Vata* is specially confined to *Koshtha* resulting in stimulation of digestive power and absorption of food. *Medodhatwagni Mandhya* takes place due to which the capacity to digest *Meda* by the *Medodhatwagni* is hampered, leading to the formation of *Apakwa* (undigested) *Meda* which is incapable of nourishing the further *Dhatu*. The *Ama Meda* gets accumulated in *Sarvanga* especially in the *Sphig-Udar-Stana* regions resulting in *Sthaulya*.

**RUPA (SYMPTOMS)** <sup>[22]</sup>

*Acharya Charaka* has described eight specific *Rupas* which are as follows:

- ***Ayushohrasa* (Diminution of lifespan):** Life expectancy decreased because of over production of *Medo Dhatu* at expense of other *Dhatu*s therefore, other *Dhatu*s could not be nourished properly.
- ***Javoparodha* (Lack of enthusiasm):** The *Shaithilya* (flabbiness), *Saukumarya* (delicacy) and *Guruta* properties of *Meda Dhatu* causes *Javoparodha*. Thus, these persons have lack of enthusiasm.
- ***Kricchavyavaya* (Difficulty in sexual act):** Due to obstruction in genital passage by *Meda Dhatu* and less production of semen.
- ***Daurbalya* (Debility):** This result because of the deranged metabolism owing to malnourishment of the *Dhatu*s.
- ***Daugandhya* (Foul smelling of body):** Bad smell results due to excessive sweating, innate quality of *Meda Dhatu* and morbid nature of vitiated *Meda*.

- **Swedabadha (Distressful sweating):** On account of the admixture of *Kapha* with *Meda*, *Vishyandi*, *Bahutva* and *Guru* properties of *Meda*.
- **Kshudhatimatrata (Excessive hunger):** Because of increased *Agni* in *Koshtha* and vitiation of *Vata* by obstruction of *Meda*.

### PATHYA-APATHYA

- **PATHYA AHARA-** *Yava, Kodrava, Mudga, Rajmasha, Adhaki, Kulath, Chanaka, Masoor, Vrintaka, Patrashaka, Patola, Kapitha, Jamun, Amlaka, Takra, Madhu, Ushnodaka, Tila Taila, Sarshap Taila, Aristha Asava, Rohit Matsya*
- **APATHYA AHARA-** *Godhuma, Navanna, Shali, Masha, Tila, Madhurashaka, Kanda, Madhurphala, Dughda, Ikshu, Navneet, Ghrita, Dadhi, Anupa- Audaka-Gramya Mamsa*
- **PATHYA VIHARA-** *Shrama, JAGRANA, Vyavaya, Nitya bhraman, Chintana, Shoka, Krodha*
- **APATHYA VIHARA-** *Sheetala Jal Snana, Diwasapna, Avyavaya, Sukha shaiya, Nityaharsh, Achintana,*

### CONCEPT OF OBESITY

Obesity is a medical condition, sometimes considered as a disease, in which excess body fat has accumulated to such an extent that it negatively affects health. Any person who has a body mass index greater than the 85<sup>th</sup> percentile for young adults is obese.<sup>[23]</sup> BMI is calculated as weight (kilograms)/height (meters)<sup>2</sup>. Normal range of BMI is 18.5 to 25 kg/m<sup>2</sup>. Individuals with BMI between 25 kg/m<sup>2</sup> and 30 kg/m<sup>2</sup> are considered overweight and BMI greater than 30 kg/m<sup>2</sup> are classified as obese.

The fat in an obese, is deposited in the subcutaneous, retroperitoneal, peritoneal tissue and omentum.<sup>[24]</sup> The greed of man to consume excessive food in affluent societies has led to create the problem of obesity. Obesity is also associated with serious diseases like diabetes mellitus, hypertension, atherosclerosis and endocrinal disorders etc. Obesity can be classified as:

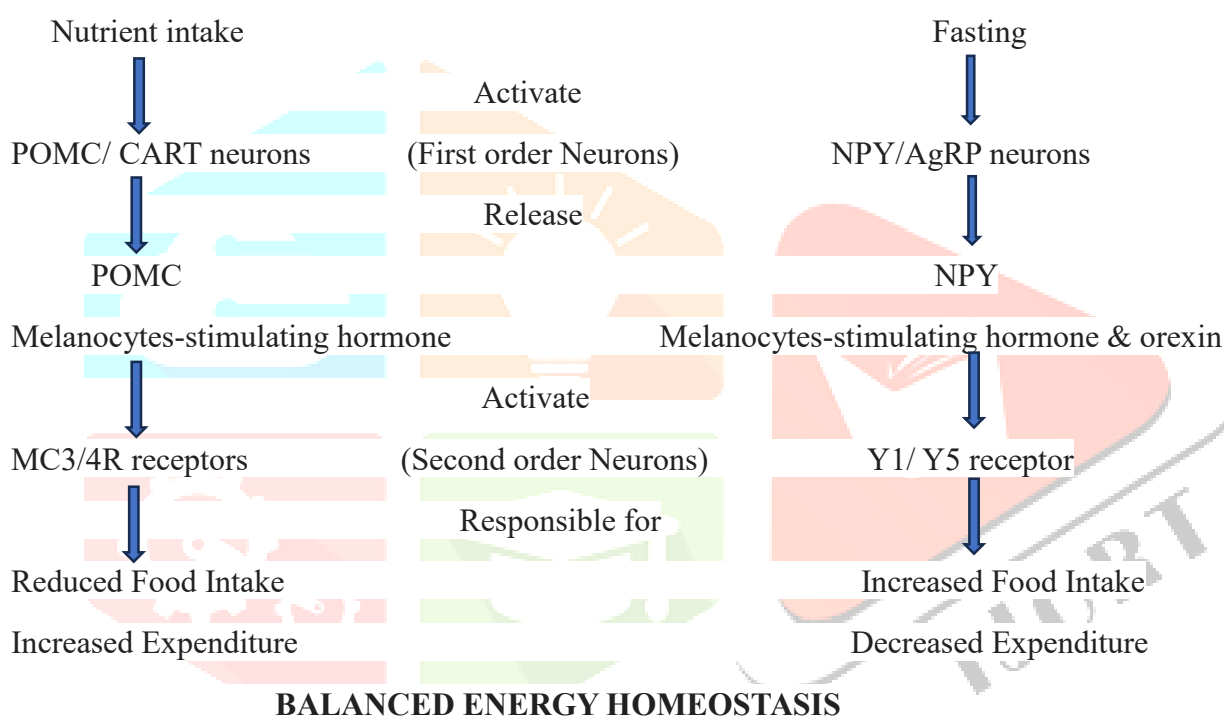
- **Android/ male type** – Apple shaped or truncal obesity in which increase the girth of abdomen/trunk is the peculiar of Asiatic males, main presentation of this type obesity is metabolic syndrome / Diabetes mellitus, hypertension & coronary artery disease.
- **Gynaenoid type/Female type-** Pear shaped in which the increase the circumference of pelvic region & main complications of this type are Osteoarthritis, Gall bladder stone, impotency & varicose veins in calf muscles.

Basically, obesity is a disorder of energy homeostasis. The important cause of obesity in most of the obese patients is the excess intake of food over calorie expenditure. The following are the factors that disturbed the energy homeostasis:

- **DIETARY FACTORS:** Diet rich in fat and carbohydrate like cheese, butter, egg yellow, fat meat, lard and other animal fat, sweet curd or yogurt etc.
- **AGE FACTOR:** Both age and occupational factors play part in developing obesity. The table or desk workers develop more obesity than the ambulating workers.
- **GENETIC FACTORS:** obesity tends to be familial. Homozygous obesity in children is much more common than one without having one's parents obese.
- **ENDOCRINE FACTORS:** Undiagnosed and untreated hormonal disorders, such as hypothyroidism, hypercortisolism and hypogonadism can contribute to the development of secondary obesity.
- **PSYCHOLOGICAL (behavioural and emotional) FACTORS:** sometimes people do have sight hunger i.e., hunger starts after seeing some unusual delicacies of food at any time even at odd hours due to overactivity of the emotional centres in the hypothalamus.

The hypothalamus is a master regulator of energy homeostasis. The two sides of energy equation intake and expenditure are regulated by neurohormonal mechanism. This mechanism can be divided into three components as follows-

- I. The afferent system/ peripheral system generates signals from various sites & provide to the central processing system in brain. Its main components are leptin, ghrelin, peptide YY, GLP-1 & insulin.
- II. The central processing system resides in the arcuate nucleus of the hypothalamus where afferent signals are integrated to generate efferent signals. Two sets of neurons participate in this system are:
  - First order neurons that communicate with second order neurons
    1. POMC and CART neurons
    2. NPY and AgRP neurons
  - Second order neurons
    1. Neurons that bear Melanocortin receptors 3 and 4 (MC3/4R)
    2. Neurons that bear Y1 and Y5 receptors
- III. The efferent system consists of signals generated by second order neurons and is organized along two pathways, catabolic and anabolic that control food intake and energy expenditure.



### Measurement of obesity [25]

It can be assessed in several ways which are mentioned as follows:

- Weight and Height ratio
- Measurement of skin-fold thickness
- BMI
- Circumference ratio (Waist/Hip ratio).

### COMPLICATIONS OF OBESITY:

Heavy weight of an obese person may cause

- Flat feet
- Osteoarthritis
- Varicose vein
- Ventral and diaphragmatic hernia
- Cholelithiasis resulting in cholecystitis
- Intertriginous dermatitis

## PREVENTION:

- Weight gain should be controlled before adolescence than to treat the existing obesity in adults.
- Lifestyle like dietary habits, physical activity and behaviour modification should be done.
- Individuals must learn how and when energy is consumed, how and when energy is expended and how to incorporate this into their daily lives.
- Education to the house wives or mother who must plan and impose the effective dietary patterns for future life of their growing children.
- Country administrators should look to the benefit of people by controlling food production on both qualitative and quantitative basis. They should encourage agriculturists to grow food having low calorie and high nutrient value.

## DISCUSSION

Metabolic disorder is one of the major problems with aging that leads to several health complications. The major risk for metabolic disorder includes the consumption of unhealthy diet, oily and junk food, a sedentary lifestyle, lack of exercise, psychological factors along with genetic factors etc. obesity is one of the major metabolic disorders all over the world occurrence. *Acharya Sushruta* mentioned *Ahara Rasa* as the main culprit for *Sthaulyata*. *Atisthaulya* is considered as one of the eight despicable conditions by *Acharya Charaka*. He described pathogenesis of *Atisthaulya* in detail, involving *Rasa* and *Medadhatu* as important *Dushyas*. *Acharya Vagbhata* has considered *Sthaulya* as *Dushchikitsya Vyadhi* due to limited choice of drugs and diet for *Sthula* person. He mentioned that *Amadoṣa* is the cause behind *Medoroga*. *Samanaya Visheṣa Sidhdhanta* and *Ashraya ashrayee Sambandha* between *Doṣa-Dushyas*, there is direct relation between *Kapha Doṣa* & *Medodhatu* i.e., increased consequences of *Kapha* directly leads to increment in *Medas* proportion. All *Acharyas* have given nearly same pathogenesis in which *Kapha* & *Medodhatu* play vital role leading to *Medoroga*. Marked obesity is a serious health hazard and may predispose to a number of clinical disorders and pathological changes such as diabetes, hypertension, atherosclerosis, osteoarthritis, non-alcoholic fatty liver disease, cholelithiasis.

## CONCLUSION

Faulty lifestyle or sedentary habits are responsible for origin of metabolic disorders like obesity. In present era obesity has become a burning problem as the life style changes, lack of physical exercise, faulty dietary habits and urbanization precipitate the disease. *Sthaulya* is mentioned in *Kaphaj Nanatmaja* and is *Meda* dominant disorder so *Kaphaprakriti* persons are more prone to obesity so they should be advised proper diet regimens and exercise as well as avoid *Kapha Prakopaka Ahara-Vihara*. Obese peoples may crave more calorie-dense foods and are more likely to store extra calories as fat that results weight gain. *Jatharagni* is impaired, the *Bhutagni* and *Dhatwagni* especially *Medo Dhatwagni* is impaired resulting of the homologues nutrients present in *Poshaka Medo Dhatu* will be in excess in circulation and ultimately develops *Medoroga*. Lastly, *Agni* plays a very important role in growth, development & maintenance of the body. So, the *Agni* should be maintained at equilibrium by changing the life style.

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