

METABOLIC SYNDROME IN AYURVEDA¹*Dr. Jaspreet Singh Sodhi and ²Dr. Richa Sharma¹Assistant Professor Department of Kayachikitsa, Main Campus, Uttarakhand Ayurveda University, Harrawala, Dehradun, Uttarakhand, India.²Assistant Professor Department of Agad tantra, Main Campus, Uttarakhand Ayurveda University, Harrawala, Dehradun, Uttarakhand, India.***Corresponding Author: Dr. Jaspreet Singh Sodhi**

Assistant Professor Department of Kayachikitsa, Main Campus, Uttarakhand Ayurveda University, Harrawala, Dehradun, Uttarakhand, India.

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ABSTRACT

Metabolic syndrome (MetS) is a multi-factorial metabolic disorder, which is associated with a cluster of pathologies including central obesity, hypertriglyceridemia, impaired glucose tolerance and insulin resistance, collectively all these are known as MetS. Metabolic syndrome (MetS) increases the risk of cardiovascular diseases, diabetes, CKD and other metabolic disorders. There has been a heightened awareness of MetS in the past few years and a subsequent increase in clinical attention directed towards its prevention, due to its strong association with morbidity and mortality. In this perspective ancient treasure of medical knowledge **Ayurveda** strongly focus on two concepts of diseases first one is related to outcome of over-nutrition and second one, related to under-nutrition. The disease MetS is the outcome of over nutrition due to defective tissue metabolism. According to Ayurveda it can be understood under umbrella of Medovaha srotodusti (Defective metabolism at the level of lipids and fat). Initial condition of MetS can be compared with Medovaha srotodusti lakshana. The fully developed MetS without complications can be compared with Apathyanimittaja prameha and medoroga, whereas complicated stage of MetS can be compared with Updrava of Avaran. Ayurveda treatment of metabolic syndrome depends upon its various stages. The lifestyle can be modified according to Pathya (Do's) and Apathya (Don't) mentioned in the Ayurveda classics.

KEYWORDS: Metabolic syndrome, CVD, CKD, Diabetes.**INTRODUCTION**

Metabolic syndrome is a lifestyle disorder which is prevalent globally, imposing burden on the society in terms of health hazards and treatment expenditure. It increases the risk of Diabetes mellitus, CVD, CKD and Insulin Resistance.^[1,2] MetS is also known as Syndrome X or Insulin Resistance Syndrome.^[3,4] The criteria of MetS has evolved since the original definition by WHO in 1998.^[5] The major features of MetS include central adiposity, hypertension, raised triglyceride, low HDL and fasting hyperglycemia.^[6] Hence it is a chronic disorder; long-term treatment with allopathic medicines increases the complications, and mortality in the Patients of MetS. A better protocol incorporating Ayurveda line of management is necessary for reducing the life threatening burden in the patients. Some studies have shown its prevalence in the India to be an estimated 24% of the adult population and the prevalence increases with age.^[7] Moreover the rising prevalence and severity of obesity in the children is initiating feature of MetS in younger population.^[8] Unhealthy food habits, high

caloric diet and sedentary life style etc. causes insulin resistance and central obesity, which leads to MetS in large population.^[9,10] The syndrome is thought to be caused by an underlying disorder of energy utilization and storage.

There is not any effective and safe treatment for MetS in Modern medical sciences. World is looking forward for prevention and treatment of MetS though Ayurveda. For its prevention and treatment, it is must to understand metabolic syndrome in Ayurveda perceptively.

DIAGNOSTIC CRITERIA FOR METABOLIC SYNDROME (MetS) NCEP-ATP III	
<p>PRESENCE OF 3 OR MORE THAN 3 OF THESE 5 CRITERIAS</p>	<ul style="list-style-type: none"> ➤ Waist circumference >102 cm in males >88 cm in females ➤ Raised Triglyceride >150 mg/dl or specific medication ➤ Low HDL cholesterol <40 mg/dl in males <50 mg/dl in females or specific medication. ➤ Hypertension- Blood pressure >130/85 mm/Hg or specific medication. ➤ Fasting plasma glucose >100 mg/dl or specific medication or previously diagnosed Type2 DM.

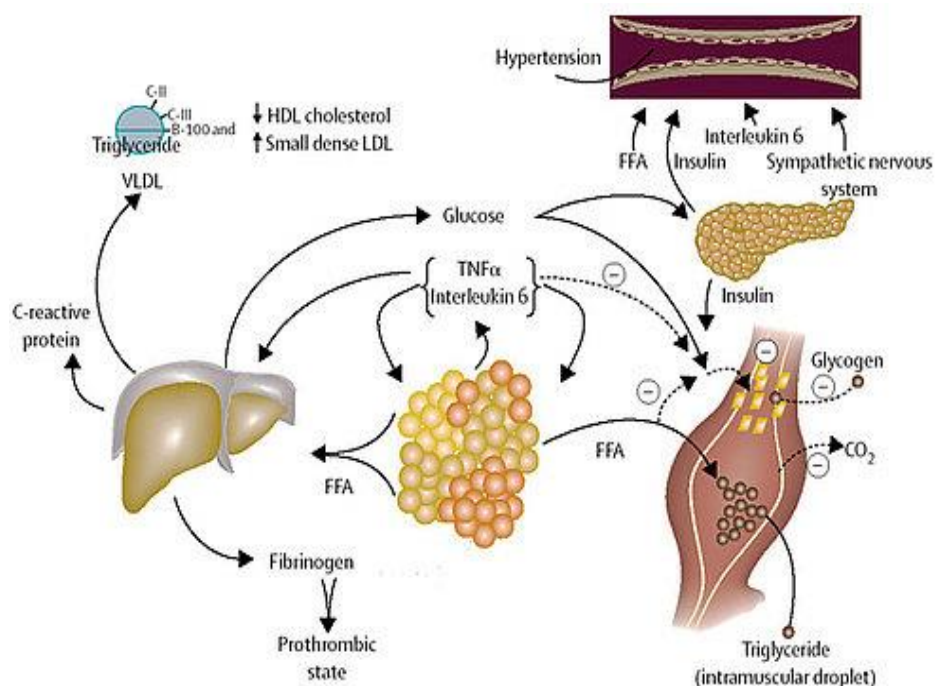
SAMPRAPTI (AETIOPATHOGENESIS)

Metabolic syndrome is the result of improper metabolism. In Ayurveda metabolism is considered the prime function of Agni (Metabolic state). Various causes of metabolic syndromes like, sedentary lifestyle, oily food, excessive calorie consumption and lack of exercise etc. mainly vitiate Agni. Ayurveda is very much concerned about conservation of health rather than eradication of disease. It presumes that improper dietary habits and deranged functions of different sets of Agni (Metabolic states), give rise to formation of Ama (Reactive Antigenic Factor i.e RAF).

When this preformed Ama interacts with Medadhatu (Adiposity of the body), it alters the nature of adipose tissues including lipids (especially cholesterol). This form of Ama, when circulates all over the body, leads to blockade of micro-channels (Srotosanga) and precipitate antigenic reactions and finally generate series of inflammatory events in the body. The interaction of Ama with fat tissues is known as Sama Medadhatu, which is the main cause of Medoroga and it leads to variety of metabolic disorders.

The **initial stage** of metabolic syndrome can be compared with Medovaha Srotodusti. In the **middle stage** metabolic syndrome turns in to T2DM and HTN. So it can be said as the condition of Vyadhi Sankarya. In **later stage** of the metabolic syndrome, different complication may occur like acute pancreatitis, CAD, retinopathy, neuropathy, nephropathy and CVA etc.

In the pathogenesis of MetS, the main etiological factors are Central adiposity and Insulin resistance. Central (Visceral) adipose tissue has tendency to direct these FFAs directly to the liver.^[11] These FFAs initiate inflammatory mechanism and causes release of several pro-inflammatory mediators (cytokines like TNF-alpha and ILs etc.), from the liver.^[11] These pro-inflammatory mediators then directed to the systemic circulation and gives rise to other consequences of MetS. In MetS, as per modern pathology, insulin resistance is the leading cause which is nothing other than the result of increased free fatty acids in the blood due to the over nourishment or over consumption of high calorie diet.^[12]



[CENTRAL ADIPOSITY: TRIGGERING FACTOR OF MetS]

ROLE OF AVARANA IN METABOLIC SYNDROME

The disease conditions described in Ayurveda, which can be correlated with MetS, are Athisthoulya (obesity), Madhumeha (Diabetes mellitus), Medodosha (dyslipidaemia) and Vatavyadhi (Hypertension) which all comes under the umbrella of Santarpanjanya vyadhi. Acharya emphasize the role of Avarana in the pathogenesis of Athisthoulya (obesity) and Madhumeha. Thus it can be concluded that Avarana is playing an important role in the pathogenesis and manifestation of MetS.

Understanding of Avarana pathology in MetS, in terms of etiology (Hethu), symptomatology (Lakshan) and management (chikitsa), will bring hopeful results to treat MetS and its complications. In MetS, on emphasizing the aetiology, Majority of the etiological factors (Nidanas) are Santarpan in character like excess food (Atyasana), heavy food (Guru anna), unctuous food (Snigdha anna) etc., thereby increasing Kapha and resulting in obstruction (Sanga) type of Srotodushti and will be the primary cause of Avarana of Vata.

In MetS, as per modern pathology, insulin resistance is the leading cause which is nothing other than the result of increased free fatty acids in the blood due to the over nourishment. It is blocking the entry of glucose into the cell resulting in obstruction (Sanga) type of vitiation of Srotas. Thus the importance of Srothodushti in manifestation of MetS can be well established.

The etiological factors of obesity (Athisthoulya) as described by Acharya Charaka are Overeating (Atisampooranam), Heavy food (Guru anna), Sweet food (Madhur aanna), Cold food (Sita aanna), Unctuous food (Snigdha aanna), Abstinence from sexual intercourse (Avyavaya), Lack of exercise (Avyayama), Sleeping in day time (Divaswapna), Persistent euphoria (Harshnithyatwa) and Genetic causes (Beeja bhaga) etc.

AYURVEDIC APPROACH TO MANAGEMENT OF MetS

In Ayurveda for the management of various diseases, two main therapeutic measures have been described which are samshodhan and samshaman. In this, Samshodhan therapy tries to eliminate the root cause of disease by harmonizing the doshic imbalance with the help of panchkarma therapy. While samshaman therapy, tries to balance these doshic imbalance at Sub optimal level Under Samshodhan therapy, Procedures found clinically effective in patients of MetS are shodhana Basti (purificatory enema), Ruksha udvartana (dry powder massage all over the body) and Mriduvirechana (mild purgation).

The treatment protocol which should be incorporated is as follows-

- Nidan parivarjana is considered as the main therapy in the management of various diseases as described in Ayurveda. Nidan parivarjana is "To avoid the risk factors".
- Different yogasana may be helpful because yogasana creates balance between nervous and endocrine system, which directly or indirectly influences all systems and organs of the body.
- In MetS, the main pathological factor is disturbance of agni. Those drugs which pacify agni, should be primarily used such as Chitrakadi Vati, Trikatu Churna, and Pippali Churna etc.
- In MetS, hyperglycemia and insulin resistance is also there which affect overall health of an individual. Those medicines which helps to boost up Oja as Guduchi, Amalaki, Haridra, and Silajatu etc.
- Compound preparations which are found to be helpful In the patients of MetS are
 - 1) **Guggulu-** Pushkarbrahmi, Medohar, Punarnavadi, Gokshuradi, Triphala etc.
 - 2) **Vati-** Sarpagandha, Arogyavardhini, Lasunadi etc.
 - 3) **Kwatha-** Phalatrikadi, Rasnaerandadi, Dashmoola, Gokshuradi, Varunadi etc.
 - 4) **Churna-** Sarpagandha, Nishamlaki, Arjuntwak, Gokshuradi, Kalmegha, Triphala, Punarnavadi, Brahmi, Jatamansi, Sankhpushpi etc.
 - 5) **Rasa-aushadhi-** Hridroga chintamani rasa, Vrihat vata chintamani rasa, Loha bhasma, Abhrak bhasma, Trivanga bhasma etc
 - 6) **Loha** – Yakritplihahari, Tryaushanadi etc

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