

**METABOLIC SYNDROME AND AYURVEDA: A CRITICAL REVIEW****Baghel Pramod Kumar<sup>1\*</sup>, Pawle Tribhuwan Singh<sup>2</sup> Kashyap Lavleen<sup>3</sup>**

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**ABSTRACT**

Metabolic syndrome is a burgeoning global problem. Obesity, metabolic syndrome and diabetes mellitus are increasing to epidemic proportions globally. The global impact of these disorders is immense in terms of human suffering and economic burden. There is an urgent need for a more effective understanding of these disease processes and their management, including the use of natural strategies that are affordable and efficacious. In modern medicine no exact treatment is available, if present has adverse effects but in *Ayurvedic* system of medicine various measures are given. This paper reviews about the metabolic syndrome in *Ayurveda* and its management.

**KEYWORDS:** *Metabolic-Syndrome, Ayurveda, Management.***INTRODUCTION**

Metabolic syndrome is a burgeoning global problem. Obesity, metabolic syndrome and diabetes mellitus are increasing to epidemic proportions globally. The global impact of these disorders is immense in terms of human suffering and economic burden. There is an urgent need for a more effective understanding of these disease processes and their management, including the use of natural strategies that are affordable and efficacious. Metabolic syndrome is a cluster of conditions increased blood pressure, a high blood sugar level, excess body fat around the waist and abnormal cholesterol levels that occur together, increasing your risk of heart disease, stroke and diabetes. Having just one of these conditions doesn't mean you have metabolic syndrome. However, any of these conditions increase your risk of serious disease. If more than one of these conditions occur in combination, your risk is even greater.

Diet and lifestyle are major factors thought to influence susceptibility to many diseases. Drug abuse, tobacco smoking and alcohol drinking, as well as a lack of exercise may also increase the risk of developing certain diseases, especially later in life. In modern medicine no exact treatment is available, if present has adverse effects but in *Ayurvedic* system of medicine various measures are given. The health care system known as Ayurveda has much to offer in this regard. The etiology, classification, pathogenesis and management are discussed at length and in detail in the Ayurvedic texts.

In obese individuals the life span decreases because of laxity, softness and heaviness of fat there is restriction in movement. Further, due to non-abundance of semen, there is difficulty in sexual intercourse, due to disequilibrium of *Dhatus* there is debility, foul smell is due to defect in fat and excess sweating. Due to association of *medas* with *Kapha* it is of oozing nature having heaviness and intolerance to physical exercise there is excess sweating, because of intensified *Agni* and increase of *Vayu* in stomach there is excessive hunger and thirst. Due to obstruction of passage by fat *Vayu* moves faster and stimulates digestion and absorbed food, hence the person digests food quickly and further desires to have food in excess quantity and even short delay in consuming food may cause severe disorders.

**Obesity & High blood pressure:** Multiple factors are responsible for increase in blood pressure in obesity. Weight gain is associated with decrease in elasticity of blood vessels & increase heart rate. Excess calories are deposited in body as fat in fatty tissue. This fatty tissue increases demand for oxygen & nutrients, which in turn increases amount of blood circulating in the body. More blood traveling through arteries adds pressure on walls of arteries leading to increase in blood pressure. Obesity increases level of insulin in body. Insulin causes sodium & water retention in body, which results in increase in blood volume & extra pressure on arteries. All of these factors can increase blood pressure.

**Obesity & Diabetes: Increased blood sugar level:** Type 2 diabetes is a common health problem in diabetes. Insulin controls blood sugar. Insulin is required for the entry of sugar (glucose) into body cells from blood. Excess body fat in obesity makes body resistant to insulin. Because of this insulin resistance, sugar will remain in blood, which will lead to increase in blood sugar or diabetes. High amount of sugar in blood leads to complications in kidney, eyes, blood vessel and heart.

**Atherosclerosis or fatty deposits in blood vessels:** Cholesterol is carried in the blood as two compounds: Low-density lipoproteins (LDL) and High-density lipoproteins (HDL). HDL is also called the 'good' cholesterol and LDL is also called the 'bad' cholesterol. Obesity is associated with low levels of good (high-density lipoprotein) cholesterol and high levels of bad (LDL) cholesterol. When cholesterol levels are high, some of the cholesterol is deposited on the walls of the blood vessels. Cholesterol deposits reduce the elasticity of blood vessels, narrows blood vessels & decreases blood flow. All these changes lead to atherosclerosis and an increased risk of heart disease & stroke.

**Coronary artery disease – angina & heart attack:** Atherosclerosis (fatty deposits in arteries) in coronary arteries (arteries that supply heart) reduces blood supply to heart. Decreased blood flow to heart can cause angina (chest pain) and complete blockage of blood flow to heart can cause heart attack. The World Health Organization says more than 1 billion adults are overweight and 300 million of them are obese, putting them at much higher risk of diabetes, heart problems, high blood pressure, stroke and some forms of cancer.

## IN AYURVEDA

Ayurveda is a comprehensive, personalized and sustainable health system based on logical principles. The nature of logic in Ayurveda differs from the modern medicine's reductionist approach. Unlike ethnopharmacology, Ayurveda is the "science of life" (Ayusho veda) and hence differs principally and fundamentally from modern medicine. Ayurveda defines health as "the equilibrium of the three biological humors or the doshas (Vata, pitta and kapha), seven dhatus, agni and a state of pleasure or happiness of the soul, senses and the mind". Ayurvedic understanding of metabolic diseases involves a multifaceted approach.

The classical *Ayurvedic* texts have vividly described *Santarpanjanya Vikaras* (Comprise of diseases due to over nutrition and defective tissue metabolism). *Ayurveda* mainly focus upon conservation of health rather than disease eradication. It presumes that improper dietary habits and deranged functions of different sets of *Agni* (Metabolic fire) give rise to formation of *Ama* (reactive antigenic factor). Since last few decades, the conventional system of medicine is focusing on the concept of metabolic syndrome, which seems very similar to the concept of *Santarpanjanya Vikaras* of *Ayurveda*. Various factors in the body cause disturbances in the production of *Medadhatu* (Lipids) prime of them are *Medodhatvagni* (Lipid metabolic process). In this whole process the quantity (amount and proportion) and quality (contents) of *Medadhatu* (Lipids) are also disturbed by the same. When *Medadhatu*

(Lipids) interacts with preformed form of Ama (reactive antigenic factor), it changes and alters the quality and quantity of fatty tissues including cholesterol. The interaction of Ama (reactive antigenic factor) with fatty tissues is known as *Sama Medadhatu* (unhealthy and bad lipids). This form of Ama (reactive antigenic factor), when circulates all over the body may lead to blockade of micro-channels and precipitate antigenic reactions and generate series of inflammatory events in the body. If such categories of Ama (reactive antigenic factor) interact with *Medadhatu* (Lipids), it may lead to a variety of metabolic disorders.

## DISEASE ETIOLOGY

*Sushruta* stated that 'Duhkha' (grief) is the root cause of diseases- "*Taddhukhasamyoga Vyadhaya Uchyante* |" (association of miseries is called 'Duhkha'). That means, if one avoids *Duhkha*, there would be no disease. In order to avoid, the removal of causes that are attributed with *Duhkha*, needs attention. *Charaka* has listed the causes for *Duhkha*. *Dhīdhr̥tismrtivibhramsha Samprapti Kalakarmanam / Asatmyarthagamashceti Jnatavya Dukhahetava* // "Derangement of intellect, restraint and memory, advent of time and action and contact with unsuitable sense objects should know as the cause of misery". *Charaka Samhita* has discussed three main reasons for disease: "...*Asatmyendriyarthasamyoga, Prajnaparadha, Parinamashceti Trayastrividhakalpa Hetavo Vikaranam Samayogayuktastu Prakrtihetavo Bhavanti*".

**1. Asatmyndriyartha Samyoga-** Is extreme use, under use and abuse of sense organs while aligning with their objects. That means indulging cognitive organs, viz., eyes, nose, ear, tongue and skin, in contrary methods cause disease. For instance, listening music in high decibels triggers ear related diseases, which is called '*Aindriyaka*'.

**2. Prajnaparadha-** Is intellectual blasphemy. Improper understanding of objects by intellect will result in adverse actions such as, negative thinking, misbehavior with noble people, lack of knowledge controlling mind, lack of good conduct are some of the reasons for intellectual errors.

**3. Kala-** Is seasonal variation. Improper intake of food such as untimely consumption of eateries while ignoring seasonal changes etc., are due to *Kalaviparinama*. Improper intake of food also causes lot of life style disorders such as stress etc. As an effect, people also suffer with stress/anxiety disorders, work tensions and so on and so forth.

**SAMPRAPTI GHATAKA (PATHOLOGICAL FACTORS)**

**Dosa-** It is a *Kapha* predominant *Vyadhi* but involvement of *Vata* and *Pitta* cannot be neglected. So, collaboration of three *Dosas* propagates the process of pathogenesis of MS.

**Kapha-** It plays an important role at the time of accumulation of *Amadosa*. Most of the symptoms of MS come under the category of *Kapha-vyaidhi* i.e. Central obesity, Hyperglycemia and Dyslipidemia etc.

**Pitta-** In the patients of MS, *Pittaja Lakshanas* are very less but most of them have *Tikshagni*. *Srotosanga* due to *Medovridhi* and potentiate *Samana-Vayu* to stimulate the *Jatharagni* so, most of the persons have good appetite. It plays role in the stage of vitiation and localization of *Ama dosas*.

**Vata-** *Vata* can create two situations in the body.

1. The state of *Avrita Vata* which provokes the *Agni* and ultimately increasing the demand for the food (*Abhyavaharana shakti*) and absorbs the nutrients.
2. Inactiveness of *Vyana Vayu*. *Vyana vayu* is responsible for proper circulation and distribution of *Dhatu*s. Due to, *Sanga* in *Srotasa*, the nutrients cannot be carried by *Vyana Vayu* to their respective *Dhatu*s. Hence, involvement of *Samana Vayu* can be clearly postulated with the evidence of *Agni Sandhuksana* and improper distribution of fat in the body proves the involvement of *Vyana Vayu*.

**Dusya-** Without *Dosa-dusya-Sammurchchhana* disease process is not possible. In the pathogenesis of MS, the excessive production of abnormal *Medadhatu* (Visceral adipose tissue) occurs, which ultimately leads to Insulin resistance, Hyperglycemia and Atherosclerotic changes etc. *Rasa*, *Rakta Mamsa*, *Meda*, *Majja* and *Sukra Dhatu* are to be seen *Dusya* in MS. Among these *Rasa*, *Meda* are the *Pradhana Dusya* in the pathogenesis of MS.

**Agni-** Due to *Dhatvagni Mandata* there is excessive formation of Abnormal Visceral adipose tissue. Which causes release of excess FFA, which mimics insulin molecule and causes Insulin resistance by downstream regulation of the insulin receptors.

**Srotasa-** In MS, the main *Srotasa* involved are *Rasavaha*, *Raktavaha*, *Mamsavaha* and *Medovaha Srotasa* along with the involvement of other *Srotasa*. The *Srotasadusti* in *Rasavaha*, *Mamsavaha* and *Medovaha Srotasa* plays key role in the pathogenesis of MS.

*Avyayama*, excessive intake of *Madhura Dravya* and sedentary life styles are vitiating factors for *Medovaha Srotasadusti* as mentioned in *Charaka Samhita*. It indicates the clear involvement of *Medovaha Srotasa* along with *Rasavaha Srotasa*. *Atisveda* and *Daurgandhya* indicate the involvement of *Svedavaha Srotasa*. Presence of *Atipipasa* indicates the involvement of *Udakavaha Srotasa*. In the pathogenesis of MS, increased fat deposition inside the muscle (*vasa*) indicates the involvement of *Mamsavaha Srotasa*.

**Srotodusti-** In the pathogenesis of MS, *Srotosanga* and *Vimarga gamana* are initial defect in *Srotasa* followed by *Atipravritti*.

**Udbhava sthana** - *Amasayottha vyadhi*.

**Vyakta sthana** – *Udara, Spika, stana* and *Gala pradesa*.

**Sanchar sthana** – *Sarvasarira* by *Rasa* and *Raktavaha Srotasa*.

**Svabhava** – *Chirkari*.

**Sadhyasadhyata** - *Krichha sadhya vyadhi*.

#### **SAMPRAPTI (ETIOPATHOGENESIS)**

**Sanchaya-** Because of excessive *Mad-Hura*, *Snigdha*, *Guru*, *Ahara* intake and *Di-Vasvapna* (sleep in day time) *Avyayama* (no exercise or physical activity) etc. and also because of *bijasvabhava* there is *Sanchaya* of *Kapha*.

**Prakopa-** The *Kapha* increases in quantity and quality and is responsible for the formation of the *Atimadhura* and *Atisnigdha Ahara Rasa*.

**Prasara-** *Atimadhura* and *Atisnigdha Ahara-Rasa* circulates all over body through channels.

**Sthanasansrya-** The circulating *Ahara Rasa* gets collected in the *Medodhatu* because of *Kha-Vaigunya* in *Medo-Vaha-Srotas* and also *Medodhatu* increases and gets accumulated in *Udara* etc.

**Vyakti-** The *Medodhatu* accumulations in body organs make them increase in size and pendulous movements when the person moves. The channels get blocked by the *Meda* causing the ill effects of the *Sthaulaya*.



**Bheda-** The manifestation of the *Upa-drava* or the complications of obesity such as *Prameha* (diabetes), *Prameha-Pidika* (diabetic ulcers), *Bhagandara* (fistula) etc. can be considered as the *Bheda* stage of *Atis-thaulayata*.

### AYURVEDIC MANAGEMENT OF METABOLIC SYNDROME

**Samshodhana** (Eliminative therapy) and **Samshamana** (Palliative therapy) therapy are the important therapeutic measures described in *Ayurveda* for the management of various diseases. In which *Samshodhana* measures hits the root cause of disease. Under *Samshodhana* therapy, Procedures like **Mridu Virecana** (light purgation), **Shodhana Vasti** (medicated enema) and **Ruksha udvartana** (gentle rubbing of skin with dry substances) may be found clinically effective in cases of MS. **Vamana** (induced vomiting by use of ayurveda drugs) therapy can be planned with caution in case of MS. Under pacificatory measures the below described guidelines may be helpful in preventing and treating the cases of Metabolic Syndrome-

**Nidana Parivarjana (Root cause elimination)** - *Nidana parivarjana* is “To avoid the risk factors”. *Nidana parivarjana* is considered as the main therapy in the management of various diseases as described in *Ayurveda*. Excess intake of carbohydrate and fat leads to abnormal visceral adiposity, which initiates cytokines-mediated pro-inflammatory process and causes excess formation of FFAs, which occupies the insulin receptors and in turn leads to Insulin resistance and other defective metabolism. Hence, *Snigdha* (oily), *Guru* (heavy), *Pichhila* (unctuous) *Ahara*, *Madyapana* (alcohol intake) as well as *Atiasan* (over eating behaviour), *Avayayam* (Sedentary life styles) etc. Should be avoided by the patients of metabolic syndrome.

**Yoga and Asana** - According to medical scientist's yoga therapy is successful because of the balance created in the nervous and endocrine system which directly influences all systems and organs of the body. *Yogasans* have often been thought of as a form of exercise. They are not exercises, but techniques which place the physical body in position that cultivate awareness, relaxation, concentration and meditation. Important *Yogasans* are *Dhanurasana*, *Halasana*, *Matsyasana*, *Yogamudrasana*, *Utkatasana*, *Vajrasana*, *Siddha yoniasana*, *Padasana*, *Makarasana*, *shavasana*, *Pavanamuktasana*, *Padotthanasana*.

**Meditative Exercise** - In this regards *Yogasana*, *pranayama*, such as *Anuloma-Viloma*, *Bhastrika*, *Kapalabhati* and *Trataka* are helpful to check the mental stressors. But these should be advice only after evaluating cardiac functions of the patients.

**Agni Promoting (Drugs correcting metabolic process) drugs** - such as *Chitrakadi Vati*, *Trikatu Churna*, and *Pippali Churna* etc.

**Ojas Promoting (Immunity enhancer) drugs** - such as *Guduci*, *Amalaki*, *Haridra*, and *Silajatu* etc.

**Compound formulations**– Important compound preparations such as- *Puskarabramhi guggulu*, *Medohara guggulu*, *Punarnavadi guggulu*, *Triphaladi guggulu*, *Nisamlaki Churna*, *Amritadi guggulu* and *Sapragandha ghanavati* are found to be helpful.

**Single drug**– *Puukaramula* (*Inula racemosa*), *Guggulu* (*Commiphora mukul*), *Kustha* (*Saussurea lappa*), *Meshshringi* (*Gymnema sylvestre*), *Vrikshamla* (*Garcinia indica*), *Rasona* (*Allium sativum*), *Sunthi* (*Zingiber officinale*), *Haridra* (*Curcuma longa*), *Arjuna* (*Terminalia arjuna*), *Guduchi* (*Tinospora cardifolia*), *Amla* (*Emblica officinalis*).

*Ayurveda* has not described as such treatment of metabolic syndrome but there are various pharmacologic and non-pharmacologic methods for the prevention and management of obesity. The food and drinks which alleviates *Vata*, reduces *Kapha* and fat should be taken. Use of *Guduchi*, *Musta*, *Triphla*, honey etc. are recommended for removing obesity or excess fat. *Vidanga*, *Shunthi*, *Yavaksar* ash powder of black iron mixed with honey, powder of barley and *Amalaka* is beneficial in the management of obesity. Similarly *Bilvadi Panchamula* mixed with honey and use of *Shilajatu* along with juice of *Agnimantha* is recommended. In diet *Prastika*, *Kangu*, *Shyamaka*, *Yavaka*, *Yava*, green gram, *Kulatha*, *Makus-Tha*, *Patola*, *Amalaki* fruits can be used for reducing fat.

The obese taking regular fatty diet such individuals should not-sleep in day time. *Halimak*, headache, cold sensation, heaviness in body parts, body-ache, edema, anorexia, nausea, rhinitis, migraine, itching, drowsiness, cough disorder of throat, derangement of memory and intelligence, fever, incapability of sense organs etc. are the abnormalities that manifests due to obesity and abnormal fat deposition in different parts of the body. Similarly *Vagbhata* has also listed a number of drugs (*Yogas*) for the management of obesity along with a specific regimen of life and diet to be followed by obese person.



**Diet Regimen (Pathya-Apathy Ahara)**

AHARA VARGA	PATHYA	APATHYA
<i>Shuka Dhanya</i>	<i>Yava, Venuyava, Kodrava, Nivar, Jurna</i>	<i>Godhuma, Navanna, Skhali</i>
<i>Shami Dhanya</i>	<i>Mudga, Rajmasha, K Kulattha, Chanak, Masur</i>	<i>Adhaki Masha, Tila</i>
<i>Shaka Varga</i>	<i>Vruntak, Patrashaka, Patola</i>	<i>Madhurshaka, Kanda</i>
<i>Phala</i>	<i>Kapitha, Jamun, Amalak</i>	<i>Madhuraphala</i>
<i>Dravya</i>	<i>Takra, Madhu, Ushnodaka, Til Tail, Sarshap Tail, Arishtha Asava, Jirnamadya</i>	<i>Jirnamadya Dugdha, Ikshu Navnit, Ghrita Dadhi</i>
<i>Mamsa</i>	<i>Rohit Matsya</i>	<i>Anupa, Audaka Gramya</i>

**Pathya-Apathya Vihara**

VIHARA VARGA	PATHYA	APATHYA
<b>Physical Regimen</b>	<i>Shrama, Jagarana, Nitya Bhramana, Ashwadi Rohana, Vyavaya</i>	<i>Sheetal Jala Sevana, Divaswapa, Avyavaya, Avyayama, Ati Ashana, Sukha Shaiya Sevana</i>
<b>Mental Regimen</b>	<i>Chinta, Shoka, Krodha</i>	<i>Nitya Harsha, Achinta, Manaso Nivriti, Priya Darshana</i>

**Role of Diet-** Diet plays an important part for the development of metabolic syndrome. Improper dietary habits specially over eating, excessive heavy diet, excessive meat and fish, sugarcane preparations, milk and its preparations increase the *Kapha Dosha* in body. Therefore, this *Kapha Dosha* produce excess tissue, mucous, fat and that helps to retain the fluid in body. Excess *Kapha Dosha* also causes the accumulation of fat that effect on elevated cholesterol and triglycerides level in blood. The imbalance *Kapha Dosha* also slows down the metabolic power as a result disturbs in metabolism and ultimately leads to weight gain. So Ayurveda considers the diet as medicine and is classified according to their taste, habitat and pattern of metabolism. As the metabolic rate is varies in different individuals so suitable selection of diet is very important for blanching state of human. According to Ayurveda the human body is ruled by three fundamental lifeforces; these are called biological humors of human body. The three humors are *Vata*, *Pitta* and *Kapha*. These are often translated as "wind", "bile" and "phlegm". *Vata* is also often called the biological air-humor, *Pitta* the biological fire-humor and *Kapha* the biological water-humor. These all three humors manifest in the body by maintaining and controlling the chemical, hormonal and electrical functions of the human body. The rasa or taste of diet depends on the predominance of particular humor for keeping the body free from diseases.

**Dietary Methods-** The eight factors like *Prakrti* (qualitative characteristics of diet) *Karana* (processing of diet), *Samyoga* (mixing/combination of diet), *Rashi* (quantity of diet), *Desha* (habitat of diet), *Kala* (time as per age, season and condition), *Upayoga Samstha* (variable digestibility of different diet) *Upayokta* (the person who takes the diet) should be considered before taking the food.

**Diet May Prevent The Metabolic Syndrome-** As the *Kapha* is the main factor for the creation of metabolic syndrome so *Kapha* aggravating taste such as *Madhura* (sweet), *Amla* (sour) and *Lavana* (salt) should be avoid and *Kapha* alleviating taste like *Katu* (pungent), *Tikta* (bitter), *Kashaya* (astringent) should be take daily.

## CONCLUSION

The incidence of MS is alarmingly increasing in developed as well as developing countries including India. The observed fact is that the exact mechanism of complex pathways of MS is not yet completely known but high calorie diet, faulty lifestyle, stressors, central obesity, endocrine disorders, aging along with genetic factors contribute a lot in the path physiology of MS. The emerging concept of MS is strikingly resemblance with over-nutritional (*Santarpanjanya Vikaras*) disorders, which include *Sthaulya / Medoroga* (Obesity / Dyslipidemia), *Prameha* (Diabetes), *Hridroga* (Cardiac diseases) of *Ayurveda*. Thus on the basis of present research work, it can be concluded that Metabolic syndrome is well defined and still evolving etiopathogenesis in biomedical sciences is as such not described in *Ayurvedic* classics, but it may be considered as the *Meda* (Lipids) dominant disorder have strong resemblance with *Prameha* (Diabetes) and *sthulya/Medoroga* (Obesity/Dyslipidemia). The conventional management of metabolic syndrome is still not very satisfactory and the current strategy of prevention and treatment of metabolic syndrome is rapidly changing. Hence many investigators in this field are inclined to undertake scientific study in treatment development from *Ayurvedic* resources.

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