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Review Article

Metabolic Syndrome

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Ayurvedic Insights into Metabolic Syndrome: Harnessing Ancient Wisdom for Holistic Health

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A growing global health concern is metabolic syndrome, a collection of linked disorders that include insulin resistance, central obesity, hypertension, and dyslipidemia. Ayurveda, an ancient Indian medical system, offers a comprehensive method for comprehending and treating this syndrome. In Ayurvedic literature, metabolic syndrome is linked to "Medopradoshaja Vikara" (Diseases due to vitiated Medodhatu) and "Santarpanottha Vikaras" (conditions caused by over-nourishment). The Ayurvedic approach emphasizes both preventive and therapeutic strategies, including Nidana Parivarjana (elimination of causative factors), Samshodhana (detoxification procedures like Panchakarma), and Samshamana, an Ayurvedic therapy designed to maintain balance in the body by managing doshas without purging them. Dietary modifications, Yoga, and daily routines (Dinacharya) also play a vital role in holistic management of the condition. Emerging research is starting to support Ayurveda's role in treating metabolic disorders and provide insight into how it can be integrated with contemporary medicine. As a result, Ayurveda has great potential for preventing and treating metabolic syndrome holistically, addressing the underlying causes of the illness, as well as its symptoms.

Keywords: Metabolic syndrome, Medopradoshaja Vikara, Santarpanottha Vikaras

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Introduction

Metabolism is the foundation of life-sustaining chemical reactions within the human body, enabling the conversion of nutrients into energy and supporting essential bodily functions, such as growth, repair, and regulation. When the metabolic processes are balanced, the body functions optimally. However, disruptions in this balance, which are often influenced by modern lifestyles, can lead to various health-related issues. One of the most concerning outcomes of metabolic imbalance is metabolic syndrome, a condition characterized by a group of risk factors including abdominal obesity, high blood pressure, elevated blood sugar, and abnormal cholesterol or triglyceride levels. Lifestyle choices are fundamentally linked to the underlying causes of metabolic syndrome. Metabolic syndrome significantly increases the risk of developing various noncommunicable diseases, including type 2 diabetes and cardiovascular diseases. The kinds of food we consume, the way we manage stress, the amount of sleep we get, and our level of physical activity all influence how susceptible we are to non-communicable diseases (NCDs).**[1]** These factors not only put stress on the body's metabolic functions but also encourage insulin resistance and fat buildup, worsening the condition. The occurrence of metabolic syndrome (MetS) in India has been reported to range between 11% and 41%, reflecting the country's wide diversity in socioeconomic and cultural backgrounds.**[2]** According to statistics, between 25% and 33% of India's urban population is affected by metabolic syndrome.**[3]** It is estimated that individuals with Metabolic Syndrome (MetS) face a two-fold increased risk of developing cardiovascular disease (CVD) within the next 5–10 years compared to those without MetS. This risk is believed to be significantly greater over a lifetime. Furthermore, MetS increases the risk of developing type 2 diabetes five-fold. Research also suggests that over 20 years, people with MetS have a 30% to 40% higher chance of developing either type 2 diabetes, cardiovascular disease, or both.**[4]** *Ayurveda's* comprehensive approach holds significant promise in managing the prevalence of lifestyle-related non-communicable diseases, such as metabolic syndrome.**[5]** Addressing metabolic syndrome has thus become a public health priority in India, requiring comprehensive strategies focused on awareness, prevention, lifestyle modification, and medical intervention.

An improved treatment approach that includes Ayurvedic principles is essential to help reduce the life-threatening impact on patients.

Metabolic Syndrome

The first detailed scientific explanation of the "clustering" of various metabolic risk factors was proposed by prominent diabetologist Gerald Reaven. **[6]** Reaven described the cluster of risk factors caused by hyperinsulinemia as 'Syndrome X,' where 'X' represents an unknown or yet-to-be-identified condition. This label remained in use for nearly ten years before it was eventually replaced by the term we now use "Metabolic Syndrome" **[7]** or" "Insulin Resistance Syndrome**"[8]** and has emerged as a pressing global health issue, affecting millions of individuals and significantly increasing the risk of cardiovascular disease and type 2 diabetes. It is characterized by a cluster of conditions including high blood pressure, excess abdominal fat, abnormal cholesterol levels, and impaired insulin function. This syndrome reflects a deep imbalance in the metabolic processes of the body.

Definition

The 2005 revised criteria from the National Cholesterol Education Program's Third Adult Treatment Panel (NCEP ATP III) are among the most commonly used definitions for diagnosing metabolic syndrome.**[9]**

First, insulin resistance was excluded. Secondly, it did not prioritize glucose levels; instead, it considered glucose abnormalities to be just as significant as the other factors when determining the diagnosis.**[10]** Notably, the ATP III criteria use waist circumference to assess obesity.

NCEP ATP III (2005 Revision)	
Criteria	Any three of the five criteria below:
Obesity	Waist circumference >40 inches (M),>35 inches(F)
Hyperglycemia	Fasting glucose ≥100 mg/dl
Dyslipidemia	Triglycerides ≥150 mg/dl
Dyslipidemia (2nd criteria)	HDL cholesterol<40 mg/dl(M),<50 mg/dl (F)
Hypertension	>130mm Hg systolic or >85 mm Hg diastolic

Aetiopathogenesis

Metabolic syndrome can be considered as a *Medopradoshaja Vikara* - a disorder arising from the disturbance of *Medo Dhatu*, since vitiated *Meda* is primary tissue implicated in its development.**[11]**

In context of metabolic syndrome, abnormal *Meda* deposited in subcutaneous tissues manifests clinically as obesity. Similarly, when unprocessed *Meda* (*Abaddha Meda*) accumulates in bladder (*Basti*), it contributes to symptoms of *Prameha.*[12] Furthermore, when it is abnormally deposited in arterial walls, it increases peripheral resistance (*Dhamanipratichaya* or arteriosclerosis)[13], resulting in symptoms of hypertension. Additionally, presence of this abnormal *Meda* in *Rakta Vaha Srotas* (channels carrying blood) leads to elevated levels of unhealthy fats, resulting in hypercholesterolemia.[14] Currently, many diseases are classified as *Santharpanajanya* disorders, primarily resulting from a sedentary, stressful lifestyle, and unhealthy dietary habits. These factors exacerbate *Kapha Dosha* along with *Mamsa* and *Meda dhatus*, contributing to development of metabolic disorders such as *Prameha* (diabetes), *Atisthoulya* (obesity), *Sopha* (inflammatory conditions), and *Dhamani Pratichaya* (atherosclerosis).[15] These conditions are often linked to metabolic syndrome, highlighting a significant connection between metabolic syndrome and *Santarpanajanya* diseases.[16] In *Charaka Samhita*, lack of physical activity and unhealthy eating habits, which are the causes of lifestyle diseases, are mentioned.[17] As per the *Acharya Charaka*, emotional disturbances such as excessive thinking, sorrow, fear, and anger can disrupt the digestive process. This disruption results in weakened digestive fire (*Agnimandya*) and indigestion (*Ajeerna*). If this condition persists, it may progress to impaired tissue metabolism (*Dhatvagnimandya*) and the accumulation of waste products in tissues (*Dhathumalasanchaya*).[18] An increase in qualities such as heaviness (*Guru*), slowness (*Mandha*), stability (*Sthira*), and stickiness (*Abhisyanthi*) can lead to an imbalance in kapha and further weaken digestion, ultimately resulting in formation of harmful metabolic waste. *Ama*, which possesses sticky and heavy qualities (*Picchila* and *Guru*), has potential to obstruct body's channels (Srothorodha).[19]

In Metabolic Syndrome (MetS), modern pathology identifies insulin resistance as the primary cause, which primarily results from elevated levels of free fatty acids in the bloodstream, often due to excessive intake of high-calorie foods.[20] Insulin resistance may be interpreted as *Srothorodha* (obstruction of bodily channels) caused by *Bahudrava Kapha*, *Kleda*, and other *Dooshyas*.

The resulting condition of hyperinsulinemia can be understood, in Ayurvedic terms, as an accumulation of metabolic waste or *Mala Sanchaya*.[21]

Management of MetS

Ayurveda, the traditional system of medicine rooted in India, emphasizes a balanced state of body, mind, and spirit to maintain health and prevent disease. The two fundamental therapeutic strategies used in Ayurvedic practice are *Samshodhana* and *Samshamana*. *Samshodhana* refers to purification therapies aimed at eliminating accumulated toxins and deeply rooted imbalances from the body, often through procedures such as panchakarma. On the other hand, *Samshamana* involves pacifying disturbed doshas using medicinal formulations, diet, and lifestyle changes, without eliminating them physically. These complementary approaches work together to restore harmony within the body's internal environment and form the basis of Ayurveda disease prevention and management.

***Nidanaparivarjanam* -** Individuals with metabolic syndrome (MS) should receive appropriate guidance to steer clear of risk factors such as high consumption of carbohydrates and fats, lack of physical activity, smoking, alcohol use, and other lifestyle-related triggers.

***Yogasanas* (*Yoga* postures) -** positively influence metabolic syndrome through a combination of physiological, hormonal, and neurological mechanisms. Regular practice improves insulin sensitivity by enhancing glucose uptake in the muscles and reducing insulin resistance. It helps regulate body weight by increasing metabolic rate and promoting fat redistribution, especially visceral fat reduction. *Yogasanas* also stimulate the parasympathetic nervous system, which lowers stress hormone (cortisol) levels, thereby reducing systemic inflammation - a key factor in metabolic syndrome. In addition, *Yoga* improves cardiovascular health by lowering blood pressure, improving lipid profiles, and enhancing endothelial function. These combined effects contribute to better metabolic balance and reduced risk of complications associated with the syndrome.

In metabolic syndrome (MetS), the primary underlying pathology involves an imbalance in *the Agni* (digestive fire). Therefore, the initial line of treatment should focus on remedies that regulate and strengthen *Agni.*[22]

Pungent (*Katu*), bitter (*Tikta*), and astringent (*Kashaya*) tastes offer valuable benefits. They possess properties such as enhanced digestion (*Deepana*), promotion of metabolic activity (*Pachana*), and reduction of excess fat and moisture (*Lekhana* and *Meda-Kleda Upashoshana*). These actions support the digestion of *Ama*, help restore impaired digestive fire (*Agni Vaishamya*), and clear blockages in the bodily channels (*Srothorodha*), as well as correct imbalances related to *Kapha* and *Meda*.**[23]** Dietary guidelines rooted in *Ahara Vidhi* and the incorporation of *Dinacharya* and *Ritucharya* enhanced long-term compliance and disease management.

Discussion

Metabolic Syndrome (MetS) is a cluster of lifestyle-related disorders with complex etiopathogenesis, strongly aligned with the Ayurvedic concept of *Medopradoshaja Vikara*, in which the vitiation of *Medo Dhatu* plays a central role. The accumulation and abnormal distribution of *Meda* in various tissues contribute to clinical conditions, such as obesity, diabetes (*Prameha*), hypertension, and hypercholesterolemia, mirroring modern MetS manifestations. Ayurveda attributes these conditions largely to *Santharpanajanya* (over-nourishment) disorders triggered by sedentary habits, improper diet, and mental stress. These causative factors disturb *Kapha*, *Meda*, and other *Dooshya*, leading to *Srothorodha* (channel obstruction), *Agni Vaishamya* (digestive imbalance), and *Mala Sanchaya* (toxic accumulation). *Ayurveda* addresses these foundational issues rather than merely managing symptoms, and offers a personalized and comprehensive therapeutic approach. Treatment strategies involve both curative and preventive approaches. *Samshodhana* (purificatory therapies) are employed to eliminate deep-seated toxins and restore the natural functioning of digestive and metabolic processes. *Samshamana*, an *Ayurvedic* therapy designed to maintain balance in the body by managing doshas without purging them, including the use of specific herbs and dietary modifications, further aids in correcting *Dosha* imbalance and improving lipid and glucose metabolism. Lifestyle guidance rooted in *Ayurvedic* routines (*Dinacharya*) and seasonal practices (*Ritucharya*), along with the removal of causative factors (*Nidana Parivarjana*), enhances long-term disease control. Holistic nature of Ayurveda also emphasizes mental well-being, Which plays a significant role in managing chronic conditions, such as MetS. While modern research supporting these interventions is still developing, current findings suggest that *Ayurvedic* practices, when applied appropriately, can serve as a valuable complementary approach to conventional treatment. Further controlled clinical trials are required to establish standardized protocols and validate their efficacy across diverse populations.

Conclusion

From an *Ayurvedic* perspective, Metabolic Syndrome is primarily rooted in disturbances in *Agni* (digestive fire), accumulation of *Ama* (metabolic waste), and dysfunction of *Medo Dhatu*. *Ayurvedic* management of MetS emphasizes a holistic approach involving *Nidanaparivarjana* (elimination of causative factors), *Samshodhana* (purificatory therapies), and *Samshamana* (*Ayurvedic* therapy designed to maintain balance in the body by managing doshas without purging them).

Therapies such as *Panchakarma* aid in detoxification, whereas herbal formulations help restore metabolic balance by enhancing *Agni* and digesting *Ama*. Incorporating *Katu*, *Tikta*, and *Kashaya* tastes in the diet further enhances digestion, boosts metabolism, and removes obstructions in bodily channels.

Additionally, regular *Yogasanas* improve insulin sensitivity, cardiovascular health, and stress modulation, offering multifaceted benefits in MetS management. Incorporating *Ayurvedic* dietary principles (*Ahara Vidhi*), along with seasonal and daily routines (*Ritucharya* and *Dinacharya*), ensures sustainable lifestyle modification and prevention of disease progression.

Hence, integrating *Ayurvedic* principles offers a comprehensive, preventive, and therapeutic approach for effectively managing Metabolic Syndrome.

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