VISION OF METABOLIC SYNDROME THROUGH AYURVEDA- AN ANALYTICAL REVIEW

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ABSTRACT

Introduction: The metabolic syndrome (MetS) is a clinical condition characterized by a cluster of abnormalities, including visceral obesity, hyperinsulinemia and insulin resistance, type 2 diabetes, dyslipidemia, hypertension, fatty liver, and elevated uric acid, a procoagulant state, whose borders are only provisionally set by different international agencies. Prevalence: The prevalence of MetS is increasing worldwide in parallel with the alarming rise of obesity, according to the National Health and Nutrition Examination Survey, MetS is estimated to affect up to 40% of the Indian population. Causes: It is linked to insulin resistance. The causes of insulin resistance have not yet been completely clarified. It probably involves a variety of genetic and environmental factors. Both being overweight and inactive contribute to the disease state.

Consequences: MetS increases the risk of developing type 2 diabetes and CVD (Cardio Vascular Diseases) and the risk for CVD mortality. Management: Weight loss with lifestyle modification (hypocaloric diet, increased physical activity can help in management of Metabolic Syndrome.

KEY WORDS: Metabolic Syndrome (MetS), Type 2 diabetes, Cardio Vascular Diseases.

INTRODUCTION

Metabolic Syndrome (MetS) is a multi-factorial disorder that associated with over-weight & Obesity. The most common underlying risk factors for MetS, includes insulin resistance, abdominal Obesity (mainly visceral obesity). On frequency part, approximately 25% of the world’s population has MetS\& in north Indian population it is 40 percent respectively.¹¹
Individuals who are physically inactive, obese & genetically predisposed have greater risk of insulin resistance. The importance of metabolic syndrome is not just related to its high prevalence rate but also because it predicts the development of Diabetes & CVD.$^2$

MetS is an assemblage of several inter related cardio metabolic factors often described by Obesity, Hypertension, dyslipidemia, hyperglycemia & Insulin resistance.$^{[3,4]}$ These conditions co-exist in an individual more than often might be expected by chance. MetS has been associated with an individual risk of developing type 2 DM (T2DM) and cardio vascular Disease (CVD).$^5$

Non-alcoholic fatty liver disease is now recognized to be the hepatic component of the metabolic syndrome, which along with its individual components –particularly diabetes & elevated triglycerides, is the major risk factors of the development of non-alcoholic fatty liver disease.$^6$ Non Alcoholic Steato hepatitis (NASH) may progress to cirrhosis, hepato-cellular carcinoma & liver failure.

In present Era, the Ayurveda is focusing on 2 concepts of diseases pathology.$^7$

1. Due to in excess of sustenance
2. Due to lower than sustenance

Metabolic syndrome is the disease caused as a result of over nutrition due to distressed tissue metabolism. Ayurveda hypothesizes that metabolism of body is an indication of physiological state of Agni (biological fire) at different level in the body.$^8$ Any disturbance or defection in the metabolism leads to choking of channels through a biological pathogenic factor named Ama$^9$, responsible as a part of generation in disorders like MetS. In terms of Ayurveda, SantarpanaJanya Vikara seems to have similarities with MetS. In Classical texts, it is presumed that vitiation of Kaphadoshas followed by the other Doshas, is the main initiating factor & involvement of Meda & other Dushya is of special significance, because such a pathogenic feature of the disease indicates that MetS is a systemic disorder involving the whole body. Because of deep seated nature of disease & wide spread pathogenic involvement, it is difficult to treat. These basic considerations exhibit great resemblance with the contemporary modern understanding of MetS as known today. The chief component or Dhatu which is getting affected in Santarpanajanya Vyadhi is Meda. It can be consider as chief Dushya in development of pathology. In the same way, confirmation of Central Obesity
& dyslipidemia has been approved as the main component of the basic ground of the disease. So, it is the prime most consideration to treat the disease at Dushit Meda level.

The primary point of consideration today is prevention of MetS & its complications. It is being observed that central obesity & insulin resistance are considered as the main pathogenic component of MetS\textsuperscript{10}, which is quite similar to previous concept of Obesity.

**Metabolic Syndrome – A Diagnosis**

The metabolic syndrome consists of a constellation of metabolic abnormalities that confer increased risk of Cardio Vascular disease (CVD) and Diabetes Mellitus (DM). MetS is also known as Syndrome X or Insulin Resistance syndrome.\textsuperscript{11}

It is reasonable to assume that with the alarming rise in obesity worldwide, a MetS epidemic may also be upon us. The prevalence of MetS can alter depending upon the diagnostic criteria used, and has been reported to be as high as 50% in adults aged 60 years and over in the latest data from NHANES in 2009.\textsuperscript{12}

**Metabolic Syndrome – A Diagnosis**

Synonyms of Metabolic Syndrome-
1. Android obesity syndrome
2. Syndrome X
3. Metabolic syndrome X
4. Reaven syndrome
5. Insulin resistance syndrome / Hyperinsulinemia syndrome

**NCEP-ATP III Criteria for the diagnosis of the Metabolic Syndrome**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Categorical cut-off points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated waist circumference</td>
<td>&gt;102cm (40in) Male</td>
</tr>
<tr>
<td></td>
<td>&gt;88cm (35in) Female</td>
</tr>
<tr>
<td>Elevated triglycerides</td>
<td>&gt;150mg/dl (1.7mmol/l)</td>
</tr>
<tr>
<td>Reduced HDL cholesterol</td>
<td>&lt;40mg/dl (1.03mmol/l) male</td>
</tr>
<tr>
<td></td>
<td>&lt;50mg/dl (1.3mmol/l) female</td>
</tr>
<tr>
<td>Elevated blood pressure</td>
<td>Systolic ≥130 mm Hg and/or diastolic ≥85 mm Hg</td>
</tr>
<tr>
<td>Elevated fasting glucose</td>
<td>≥110 mg/dl (6.1mmol/l)</td>
</tr>
<tr>
<td></td>
<td>Or on treatment for diabetes</td>
</tr>
</tbody>
</table>
Disease Review In Ayurvedic Classics

As metabolic syndrome is a disease of 21st century, there were not such reference found in Vedas regarding the disease? Since, it can be homologous to term MedoRoga & Sthaulya in some extent.

Obesity and lipid disorders have been highly considered in Ayurveda in context of MedoRoga and Prameha. SantarpanaJanya Vikaras have been described in Ayurvedic Parlance, as diseases due to over sustenance and diseases due to lack of sustenance. Ayurveda is very much concerned about preservation of health despite of eradication of disease. It presumes that improper dietary habits and deranged functions of different sets of Agni give rise to formation of Ama (reactive antigenic factor).[13] 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 Santarpanajanya Vikaras, which is outcome of defective Agni.

In Ayurveda, detailed description of Medadhatu (lipid tissue) in the context of Medoroga or SthaulyaRoga is clearly mentioned under Ashtaninditapurusha[14] (eight ill termed humans) alongwith, it also brings out how to maintain healthy quantity and quality of fatty tissues in the body. The production of Medadhatu is disarranged by variety of etiological factors including Medodhatvagni. Besides, the same also distract the quantity (amount and proportion) and quality (contents) of Medadhatu. When Medadhatu interacts with constructed form of Ama, it changes and alters the quality and quality of fatty tissues including cholesterol. The interface of Ama and fatty tissues results in formation of ill formed Medadhatu called as SamaMedadhatu, which is the main malefactor of Medoroga, and resides in liver (Yakrita), which is responsible for qualitative derangement of lipids and cholesterol.

In process of Circulation, in all over the body it may lead to obstruction of micro-channels and swift antigenic reactions and generate series of inflammatory events in the body. If such categories of Ama interact with Medadhatu, it may lead to a variety of metabolic disorders; metabolic syndrome is one of them.

As a whole, metabolic Syndrome is a Dushya dominant disorder, Meda plays a major role in pathogenesis of Santarpanajanya Vikaras. Meda is an important Dhatu among Saptadhatu.
Probable Pathogenesis (Table 1)
In the pathogenesis of MetS, key factors are Central adiposity and Insulin resistance. Central (visceral) adipose tissue has tendency to direct the FFAs directly to the liver. These FFAs causes release of several pro-inflammatory mediators (i.e. adiponectin, leptin, CRP etc.), from the liver, which are then directed to the systemic circulation and gives, rise to other consequences of MS. Ayurveda considers that obesity and asthenia depends chiefly upon the quality of Rasadhatu, which is source of sustenance for the entire body. That is also the source of deranged Medodhatu in terms of Medodhatuvyadhi (adiposity).

Because Medodhatu (Adiposity) is the Principle dushya in the pathogenesis of MetS, so it is obvious to discuss about Meda in brief. Medoroga and Medodosha have been described as synonyms of each other. However, Adhhamalla (commentator of Shrungdharasamhita) has tried to distinguish two types of Medoroga-
1. Adiposity including its clinical feature (Sthaulya-obesity)[15]
2. Lipid disorders where Meda acts as an etiological factor in the beginning of other diseases (secondary).

Caraka has stated that there is role of BijaSvabhava in the etiopathogenesis of certain diseases like Medoroga[16] (obesity).

VYADHI GHATAKA OF METABOLIC SYNDROME

DOSHA- KAPHA, VATA
DUSHYA- MEDA DHATU
SROTASA- RASA VAHA / MEDAVAHA
ADHISTHANA- SARVA SHAREER
SROTODUSHTI- SANGA/ ATIPRAVIRITTI
UDHBHAV STHAN- AMASHAYA SAMUTTHA

In the pathogenesis of MetS, Agni plays a very important role since beginning to the end. In the cases of MetS, Agni mandata especially at the level of Medodhatu Agni is the root cause of MetS. Dhatvagni are seven in numbers.[17]

Dhatvagni functions mainly are of two types-
1. Synthesis of new proteins
2. To yield energy for the functions of tissues
If Dhatvagni is impaired, both these functions will impair. In the view of modern physiology also, that the tissue of the body are being reformed as rapidly as they are destroyed in the course of metabolism. The organism obtains energy by the process of oxidation. No oxidation can proceed unless there is a simultaneous reduction of some other compound. The materials with which the tissue cells are synthesized are derived from food sources, which are suitable, processed during the course of their digestion and metabolism.

MetS is caused by the excessive intake of Madhuraahara, Snigdhaahara, Adhyashana (Fatty diet) and sedentary life style etc. Due to these nidana, as Ahara taken is not properly digested. This may lead to formation of Ama i.e. a reactive species. This form of Ama is distributed all over the body with Ahara rasa and mainly increases the SamaMedadhatu (Visceral Adiposity) because of its excessive unctuous and sweet nature. This Ama formation suggests that there is Dhatvagnimandata at the level of Medadhatu.

Management of Metabolic Syndrome As Per Ayurveda

Samshodhana and Samshamana therapy are the important therapeutic measures described in Ayurveda for the management of variety of diseases. Samshodhana measures hits the root cause of disease.\[^{18}\] Under Samshodhana therapy, procedures like Virechana, can be found clinically effective in cases of MetS.

Under pacificatory measures given guideline may be helpful in preventing and treating the cases of Metabolic Syndrome-

1. **Nidanaparivarjana** - Nidanaparivarjana is considered as the main therapy in the management of various diseases as described in Ayurveda. Nidanaparivarjana is –“To avoid the risk factors”.\[^{19}\] Excess intake of carbohydrate and fat leads to abnormal visceral adiposity, which initiates cytokines, mediated pro-inflammatory process causes excess formation of FFAs, which occupies the insulin receptors and in turn leads to Insulin resistance and other defective metabolism. Hence, Snigdha, Guru, Pichhilaahara, Madyapana (fatty diet) as well as Atiashana, Avayayama (sedentary life sty les) etc. are to be avoided by the patients of metabolic syndrome.

2. Exercise and Light Diet.

3. Agni Promoting drugs - such as CitrakadiVati, TrikatuCurna, and PippaliCurna etc.

4. Ojas Promoting drugs - such as Guduci, Amalaki, Haridra, and Shilajatu etc.
Management of Metabolic Syndrome Through Modern Science

The association between obesity and the development of MetS constitutes the main argument justifying weight reduction programs which, if successful, can lead to a substantial improvement or normalization of the metabolic profile of the obese\[^{20,21,22}\]. A 10kg reduction in weight equates to a 20% fall in total morbidity, 15% fall in LDL-cholesterol (LDL-C), 30% fall in triglycerides and an 8% rise in HDL-cholesterol (HDL-C).\[^{23}\] A 15-20% weight loss in the first year after diagnosis of type 2 diabetes may reverse the excess mortality of being overweight and a deliberate weight loss of 5-9 kg is associated with up to a 30-40% reduction in diabetes-related mortality.\[^{24}\] The main triggering factors in the development of MetS are oxidative stress and process of inflammation due to excessive formation and release of FFAs. Suitable therapeutic interventions targeting these oxidative and inflammatory processes may be effective in preventing and treating the MetS. Once a diagnosis of metabolic syndrome is made, the future management of the condition should be aggressive and uncompromising in its aim to reduce the risk of CVD and Type 2 Diabetes mellitus.

CONCLUSION

The emerging concept of MetS is strikingly resemblance with over-nutritional (\textit{SantarpanaJanyaVikaras}) disorders, which include \textit{Sthaulya, Medoroga and Prameha} in Ayurveda.

\textit{Ayurveda} presumes that faulty dietary habits and lifestyle errors in accordance with genetic make of an individual alters functions of different sets of \textit{Agni} (especially \textit{Medodhatvagni}), which may leads to defective tissue metabolism at one side and formation of \textit{Ama}(reactive antigenic factor) like substances at other sites.

The \textit{Samprapti} (pathogenesis) of this disease is presumed on specific \textit{Dosha-Dushya} pattern besides, the special emphasis placed to the depletion of \textit{Agni} as well as the vitiation of \textit{Medas}(Lipids). Further, chronicity of disease, dyslipidemia, impaired function of cellular enzymes, and hyperglycemia leads to the formation of \textit{Ama} like unwanted metabolic by products at respective levels of \textit{AgniVapara}. Probably this form of \textit{Ama} is predominantly associated with \textit{Dhatukshaya}, \textit{Ojokshaya} and secondary \textit{Vataprakopa}. It has a tendency to block the micro channels and derange the functions of immune system. Besides, the toxins if retained in the cell have capacity to destroy the cell or organ or system. This age-old ideas are now getting strong scientific support from the emerging concept of metabolic syndrome, Prediabetes, Insulin resistance and Type-2 DM, signifying the role of lipid disorder in the
pathogenesis and dysmetabolic state (Ama state) in this disease. The literary holistic concept of Ayurveda provides significant lead to the understanding of MetS.

Table 1.

REFERENCES


