

INTERPRETATION OF METABOLIC SYNDROME IN AYURVEDIC PARLANCE

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ABSTRACT

Obesity, diabetes mellitus are increasing in epidemic proportions globally. Metabolic syndrome described in modern science, includes clinical conditions involved in obesity, Diabetes mellitus, pre-diabetes as said in *medo roga*. Obesity is a principal causative factor in the development of metabolic syndrome. Here we report that increased oxidative stress in a accumulated fat is an important pathogenic mechanism of obesity associated metabolic syndrome. In this context we discuss the *ayurvedic* concept of *medo roga* and "*ama*" which is thought to be a toxic, pro inflammatory waste product of improper digestion.

Keywords: *Ama*, *Medo roga*, metabolic syndrome

INTRODUCTION

Metabolic syndrome is a disorder of energy utilization and storage, diagnosed by a co-occurrence of 3 out of five of the following medical conditions: abdominal (central) obesity, elevated blood pressure, elevated fasting plasma glucose, high serum triglycerides, and low high-density cholesterol (HDL) levels. Metabolic syndrome increases the risk of developing cardiovascular diseases, particularly heart failure, and diabetes.¹

AIMS AND OBJECTIVES

To correlate the pathology of metabolic syndrome with *medo roga*

To understand symptoms of metabolic syndrome with special reference to *agni*, (digestive fire), *dhatvagni*, *ama* and *marga avarodha* (obstruction of channels)

Metabolism, relates to the exchange of substances and it is invariable sign of life. Modern terms metabolism, Catabolism and anabolism refer exactly to *dhatwagni vyapara* or *paka*, comprising the *kitta paka* and *prasada paka*, respec-

tively. Catabolism implies the breakdown of large molecules and end products are of smaller size than the starting material. In addition catabolic reaction is essential energy yielding. Anabolic process are generally 'energy requiring'. The metabolic processes that occur in the body into two well defined compartments viz, i) the metabolism of food stuffs –the exogenous metabolism and the metabolism of tissues–the endogenous metabolism.²

Obesity is the central and causal component in this syndrome, but the mechanistic role of obesity has not been fully elucidated. Oxidative stress plays critical roles in the pathogenesis of various diseases. In the diabetic condition, oxidative stress impairs glucose uptake in muscle and fat and decreases insulin secretion from pancreatic β cells increased oxidative stress also underlies the path physiology of hypertension and atherosclerosis by directly affecting vascular wall cell.³

As an early instigator of obesity-associated metabolic syndrome, increased

oxidative stress in accumulated fat should be an important target for the development of new therapies.

MATERIALS AND METHODS

This article is based on review of *ayurvedic* and modern texts along with researches related to the subject. Materials related to metabolic syndrome and *medoroga* have been collected. The main *ayurvedic* texts used in these study are *Charak samhita*, *Sushruta samhita*, *Madhava nidana* and available commentaries on them. We have also referred to the modern texts and searched various research papers, websites to collect information on relevant topics.

Critical analysis of above stated references

Aetiologi

Due to disturbance in digestion process of *anupaka* as described in *charaka chikitsa sthana* chapter 15 in *Grahani Adhyaya* lies cause of metabolic syndrome.⁴ These term *anupaka* refer to the breakup of compound substances, for e.g., the sweet tasting substances, into their ultimate molecular components e.g., the intestinal monosacchride.²

Medoroga described in the various classical text of *ayurveda* referring to excess of fat deposition in the body resulting in flabby appearance. The *nidana* (aetiopathogenesis) of *medoroga* is given in the classical text of *madhava nidana*.

“Avyayamadivaswapanasleshmalahara
sevinah I

*Madhuronnarasah prayah snehanmedah
pravardhayet II*

*Medha savrutmarmargatwat pushyantyan-
tyane na dhatavah I Ma.Ni 34/4*

In a person who a) over-indulges in articles of food that conduce to the production of *sleshma*, b) leads a sedentary life and is averse to physical exercise c) over eats and resorts to day sleeping, the

predominantly sweet tasting *rasa* circulates throughout the body, very much like *ama*. From this sweet-tasting *amarasa* is formed *sneha* or oil and *medas* or fat. The latter contribute to *atisthaulya* or excessive corpulence.⁶

Pathology of Metabolic syndrome

The citation *Madhurannarasa snehatmedah pravardayat* and the *tikas* (commentaries) on the above extracted from *madhukosha* and *atankadarpana* on *madhavanidana* are obviously based on the earlier observations of *Sushruta* and *Charaka* and *Dalhana's* commentary on the former, in regard to the convertibility of sweet tasting substances as fat in such conditions as *sthaulya* (adiposity / corpulence/obesity) and *karshya* (wasting /leanness) are determined by *rasa*⁵. Hence as mentioned in *rasavaha strotas dusti hetu rasavahini dusyanti chintanam ati chintanat*⁹ can be linked with oxidative stress mentioned in modern science.

Dalhana has, in his commentary on the above, clarified a number of important points of which the following are significant. Elucidating the implications of the term *Aamavah annarasa madhurtarsch*, he has observed that the production of *amarasa* (partly or incompletely formed chyle) does not arise in the case of *medasvis* (corpulent persons) whose *agni* is *dipta* (*dipta agni*). These are cases in which the digestion of food is rapid, complete and absorption quick. The production of *ama*, at the level of intestinal digestion does not occur in such cases. To say that *medasvis* whose *agni* is *dipta* produce *ama* *rasa* will be introducing an element of contradiction, as only *mandaagni* can produce *ama*. The correct interpretation of the passage, under reference, is that it is *dhatvagni* that is *manda* and, in consequence, *ama* is produced at the level of *dhatvagnipaka*. In other words, the *annarasa* (chyle), after its

formation and absorption is not properly dealt with by *dhatvaagni*. This results in the circulation un metabolised substances^{2&5}. Due to the covering *avruta* of the *margas* or pathways by *medas* or fat and *vishistahara*, the predominantly sweet tasting substances, in circulation, are turned over as *medas* or fat, which later alone accumulates in the body. *Dhatus*, other than *medas* (adipose tissue) viz., *asthi* (bone tissue), *majja* (yellow and red marrow) and *shukra* (reproductive tissue elements) are not properly nourished and formed and they deteriorate⁵. Hence we see osteoporosis and infertility in such cases.

DISCUSSION

Signs and Symptoms of Metabolic syndrome with special reference to *medoroga*

Under current guidelines, revised in 2005 by the The US National Cholesterol Education Program Adult Treatment Panel III (2001) requires at least three of the following:

Fasting glucose ≥ 100 mg/dL (or receiving drug therapy for hyperglycemia)

Blood pressure $\geq 130/85$ mm Hg (or receiving drug therapy for hypertension)

Triglycerides ≥ 150 mg/dL (or receiving drug therapy for hypertriglyceridemia)

HDL-C < 40 mg/dL in men or < 50 mg/dL in women (or receiving drug therapy for reduced HDL-C)

Waist circumference ≥ 102 cm (40 in) in men or ≥ 88 cm (35 in) in women; if Asian, ≥ 90 cm (35 in) in men or ≥ 80 cm (32 in) in women¹³.

Medoroga (obesity) has been considered as an abnormality of body characterized by-

- Excessive increase of fat and other tissues of body.
- Bulky look of body.

- Pendulous situation of buttocks, abdomen and breast.

- Excessive anabolic conditions.

- Lack of vitality.

- Dyspnea on exertion

- Voracious appetite

- Excessive sweating and Bad odour from the body⁵

Obesity & Diabetes: Increased blood sugar level: The outcome of scientific researches in the field of biochemistry, in modern times, provides a wealth of very valuable data and these should be of considerable value to understand intelligently the practical implications of the *ayurvedic siddhanta* or conclusions i) *madhura rasa dravya* is the source of *bala* or *karmasadhana-shakti*; ii) it also contributes to *brihmana*; iii) it is convertible to *sneha* (oil) and *medas* and iv) in certain abnormal conditions engendered by *dhatvagnimandya* and the *niruddha* or blocking of and *avarana* or encompassing the *dhatugati* or metabolic pathways and *dhatumargas* or the channels of distribution of nutrients, the *madhura dravyas* are transformed en masse into fat, leading to corpulence (obesity)². Such conditions are marked by lack of *bala* or energy, susceptibility, among others, to *prameha* (diabetes mellitus), *pidaka* (carbuncle), *vatarogas* (nervous system diseases) etc. A correct appreciation of the earlier *Ayurvedic* observations viz., *madhura annarasa snehameda pravaryat* and *amaava annarasa madhurtarsch* etc will be possible only when the scientific data is provided².

The *Ayurvedic* concept of “*Ama*” is similar to the Egyptian concept of “*Ukedu*,” and the old theory of intestinal auto-intoxication propounded by Metchnikoff.

Thus, Metchnikoff believed that proteolytic gut bacteria can produce toxic byproducts (phenols, indoles, and ammonia),

from digestion of dietary proteins. These toxic byproducts of digestion accumulated with age and caused disease. Interestingly, modern evidence supports Metchnikoff, since bacterial species which metabolize dietary carcinogens (heterocyclic amines) from cooked meat and fish are associated with increased risk of tumors. The link between intestinal auto-intoxication and disease is concordant with *Ayurvedic* concepts on “*Ama*” and its pathogenic potential⁷.

Obesity and Hypertension, 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.

Atisthaulya (obesity) is considered as one of the eight despicable conditions as described by *Acharya Charaka*¹⁴ *Medas* is body tissue predominant in *Prithvi* and *Aap* (jal/ water) *Mahabhutas* similar to *Kapha Dosh*. It is characterized by *Snigdha* (unctuous), *Guru* (heavy), *Sthula* (space occupying), *Picchila* (slimy), *Mridu* (tender/soft) and *Sandra* (dense) *Guna* (qualities)¹⁷. *Sneha* (oleation), *Sweda* (production of sweat), *Drudhatva* (compactness), and *Asthipushti* (nourishment of bones) are the main function of *Medodhatu*.¹⁶ Consumption of *Guru* (heavy to di-

gest), *Sheeta* (cold), *Snigdha* (unctuous), *Madhuradi Kapha vardhaka* (sweet and *Kapha* increasing) drugs along with lack of exercise and sedentary life style result in excessive nourishment of *Medas* while other bodily elements (*Dhatus*) are deprived of nourishment. Disproportionately increased *Medas* is accountable for several serious consequences reported in *Charaka Samhita* like *Ayuhrasa* (decrease of life span), *Javoparodha* (decrease in enthusiasm and activity), *Krichravayavayata* (difficulty in sexual act), *Dourbalya* (decrease of strength), *Dourgandhya* (bad odor), *Swedabadha* (excess perspiration) and *Kshut Pipasadhikya* (excessive hunger and thirst)¹⁵. *Mandotsaham* (less activity referring to sedentary life-style), *Atisnigdham* (excessive intake of fatty substances), *Atisthaulyam* (gross obesity), and *Mahashanam* (excessive eating) constitute for causation of *Prameha* (urinary diseases including Diabetes) and these etiological factors may also initiate *Dyslipidemia*¹⁸.

Kayagni or *Pachakagni* (digestive fire) contributes its moieties to the *Dhatu* or *Dhatwagni* dealing with tissue metabolism. *Ama* (undigested toxic substance) which results from hypofunctioning of *dhatwagni* may clog to the *Srotas* (channels) leading to *Srotorodha* (obstruction of channels) which in turn increases *Medodushti* and decreases the nutrient supply to subsequent *Dhatus* namely *Asthi* (bone tissue), *Majja* (bone marrow), and *Shukra* (fertility promoting substance)¹⁹.

Santarpanottha Vikaras (diseases due to excessive nutrition are increasing during current times. *Medodushti* disorder of fat metabol-

ism serves as one of the important etiological factor in most of these disorders including ischemic heart diseases (IHD). Retention and deposition of serum lipids resulting in decreased flow of blood in coronary arteries being the underlying cause.

Line of management and selection of drugs

Ayurvedic management of Metabolic Syndrome

Obesity and Hyperlipidemia being the cause of metabolic syndrome in adolescents as well as older age groups, there is a necessity to combat them with drugs mentioned in classics which may be useful to address the associated conditions of *Medodushti*. *Medohara* drugs *lekhaniya* i.e mentioned in the classical texts which may abet our understanding of prevention and management of the condition like metabolic syndrome, Obesity and Dyslipidemia.

Administration of drugs possessing *Tikta Rasa* (bitter taste), *Ushna Veerya* (hot in potency), *Laghu* and *Ruksha Guna* (light and dry qualities), *Katu Vipaka* and *Vata Kaphahara* actions are useful.

Acharya Charaka has furnished six therapeutic measures (*Shadupakrama*), i.e., *Langhana* (lightening therapy), *Brumhana* (nourishing therapy), *Rukshana* (drying therapy), *Snehana* (oleation therapy), *Swedana* (fomentation therapy), and *Stambhana* (astringent therapy)²⁰. *Langhaneeya Dravya* (drugs causing lightness) can achieve the therapeutic effect by the dominance of *Gunas* like *Laghu* (light), *Ushna* (hot), *Teekshna* (strong), *Vishada* (non slimy), *Ruksha* (dry), *Sukshma* (subtle), *Khara* (rough), *Sara* and *Kathina* (hard). *Rukshaniya* drugs (causing dryness) should possess *Gunas* like *Ruksha*, *Laghu*, *Khara*, *Teekshna*, *Ushna*, *Sthira*, *Vishada*, and *Kathina*²⁰. The comparison of *Gunas* of both the *Upakramas* clearly indicate that a drug possessing the *Gunas* namely *Laghu*, *Ruksha*, *Ushna*, *Teekshna*, *Vishada*, *Khara*, and *Kathina* may significantly subdue *Kapha* and *Medodhatu Dushti* in the conditions like Obesity, Hyperlipidemia, and Diabetes mellitus.

Name of Gana	C.S	S.S	A.S	A.H
<i>Lekhaniya Gana</i>	+	-	-	-
<i>Varunadi Gana</i>	-	+	+	+
<i>Shalasaradi Gana</i>	-	+	-	-
<i>Lodhradi Gana</i>	-	+	+	+
<i>Arkadi Gana</i>	-	+	+	+
<i>Mushkakadi Gana</i>	-	+	+	+
<i>Nyagrodhdi Gana</i>	-	+	+	+
<i>Tryushana</i>	-	+	-	-
<i>Ushakadi Gana</i>	-	+	+	+
<i>Asanadi Gana</i>	-	-	+	+
<i>Surasadi Gana</i>	-	-	+	+
<i>Vatsakadi Gana</i>	-	-	+	+
<i>Vacha Haridradi Gana</i>	-	-	+	+

C.S: Charaka Samhita, S.S: Sushruta Samhita, A.S: Ashtanga Sangraha, A.H: Ashtanga Hrudaya

Analysis of the herbs from *medohara ganas* clearly indicates that *Tikta Rasa Dravyas* dominates the list (59) fol-

lowed by *Katu* (48), *Kashaya* (41), *Madhura* (33) , and

Amla (8) *Rasa* drugs. *Tikta* being *Laghu* and *Ruksha* reduces vitiation of *Kapha* and *Medodushti* along with neutralization of *Amavisha* through its *Deepaniya*, *Pachaniya*, and *Vishaghna* activities. *Katu rasa* exerts similar effect on *Ama*, *Kapha*, and *Medodushti* by its *Laghu*, *Ushna*, and *Ruksha* *Gunas*. It can provide significant *Rukshaneeya* effect in comparison *Tikta*, *Kashaya* *Dravyas* due to association with *Ushna* *Guna*. *Kashaya* *Rasa* being most *Ruksha* may facilitate for *Shoshana* (absorption) of liquefied or detoxified *Kapha* and *Medodhatu*. The *Dravya* possessing *Tikta* *Rasa* and *Katu* *Rasa* are to be prescribed in the initial stages (Border line of hyperlipidemia) of treatment of *Dyslipidemia* and *Kashaya* dominant drugs can be incorporated in the subsequent phases (High and very high hyperlipidemia) which facilitates for *Shoshana* (absorption) of liquefied or detoxified *Kapha* and *Medodhatu*, a state produced by *Tikta* *Rasa* and *Katu* *Rasa*.⁸

The application of *Amla* *Rasa* which is attributed with *Deepana*, *Vatanulomana*, and properties may be preferred in the last phase which subdues *Vataprakopa* induced by *Tikta*, *Katu*, and *Kashaya* *Rasa* drugs. *Agni* *Mahabhuta* dominant *Rasa* like *Katu* and *Amla* should be judiciously applied by taking into consideration the involvement of *Agni*, *Ama*, and *Srotorodha* to establish normal lipidemic state in the body. Drugs like *Priyala* (*Buchanania lanzan Spreng.*), *Shatavari* (*Asparagus racemosus willd.*), *Yashtimadhu* (*Glycyrrhiza glabra Linn.*), etc., possessing *Madhura* *Rasa* and *Snigdha* *Guna* may help to soften and uncton the vessels hardened over-

time by the deposited fat as in the case in *Atherosclerosis*.⁸

CONCLUSION

Sthaulya (*Obesity*) is considered the world's oldest metabolic disorder. It is not a single disease entity but a syndrome with many causes including combination of genetic, nutritional and sociological, oxidative stress factors.

Obesity develops as a result of a complex interaction between a person's genes and the environment characterize by disturb in metabolism long-term energy imbalance due to excessive caloric consumption, insufficient energy output (sedentary lifestyle, low resting metabolic rate) or both. Diet and life style play a significant role both in development and control of obesity. *Obesity* increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, breathing difficulties during sleep, certain types of cancer, and osteoarthritis. Hence it is first stage of (*Purvaroop*) of metabolic syndrome.

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.

In brief, a detailed description regarding *atisthulata* (*obesity/medoroga*) is given in classical literature of *Ayurveda*, which can be correlated with the clinical conditions associated with metabolic syndrome.

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*, *Triphala*, honey etc are recommended for removing obesity or excess fat. *Vidanga*, *Shunthi*, *yavaksara* ash powder of black iron mixed with honey, powder of barley and *Amalaka* is beneficial in the management of obesity. Similarly *Bilvadi pancha-mula* mixed with honey and use of *Shilajatu* along with juice of *Agnimantha* is recommended. In diet *prastika*, *kangu*, *shyamaka*, *yavaka*, *yava*, green gram, *kulatha*, *makustha*, *patola*, *amalaki* fruits can be used for reducing fat.²¹

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