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APPLICABILITY OF *GO GHRTAM* (COW'S GHEE) IN THE PREVENTION AND MANAGEMENT OF METABOLIC SYNDROME

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ABSTRACT

Metabolic Syndrome forms a cluster of metabolic derangements including Insulin resistance, Atherogenic Dyslipidaemia, Central Obesity and Hypertension that promote the development of atherosclerotic cardiovascular disease and Type 2 Diabetes Mellitus. The root cause of Metabolic Syndrome is insulin resistance, which can arise from deficiency in essential polyunsaturated fatty acids, disturbances in fatty acids within plasma, red blood cells, and eicosanoid synthesis. The emerging concept of Metabolic Syndrome has striking resemblance with *Santharpanajanya vikaras* and *Amapradoshaja vikaras*. *Agnidushti* is the major component in metabolism related disorders and the line of treatment adopted here should be *Agni dipana, Ama pachana, Kaphamedoanilapaha* and *Srothoshodhaka chikitsa*. Ghee has been given foremost importance and has been an inevitable part of diet in the Indian cuisine. Ghee is a complex lipid consisting of triglycerides, free fatty acids, phospholipids etc and Ayurveda considers *Go Ghrtam* as the best among all fats. On the other hand, there is a misbelief in common people that consumption of ghee leads to hyperlipidaemia. So, this review aims to dispel misconceptions and demonstrate the effective prevention of Metabolic Syndrome using *GoGhrtam*, as well as its management through medicated *Ghrtam*.

KEYWORDS: Metabolic Syndrome, *Goghrtam*, Cow's ghee, Medicated *ghrtam.*

INTRODUCTION

Metabolic Syndrome (MS) is a major public health and clinical challenge worldwide in the wake of urbanisation, sedentary lifestyle and changing diets. This disease is mainly the outcome of over nutrition due to defective tissue metabolism.

Metabolic syndrome (Syndrome X or Insulin resistance syndrome) refers to clustering of metabolic derangements that include Obesity, Hypertension, Dyslipidaemia, and Diabetes Mellitus associated with accelerated Cardio Vascular Diseases.[1]

Ayurveda has vividly described and conceived the concept of obesity and lipid disorders in the contexts of *Santharpanajanya vikaras (Sthoulya, Medoroga, Prameha, Hrdroga*) and *Ama pradoshaja vikaras*. Ayurveda strongly believes that overall metabolism of the body depends upon proper functioning of *Agni* and improper dietary habits cause deranged functioning of *Agni* which may lead to *Ama* formation that initiates the series of pathological events in the body.

The importance of *ghee* in Indian diets has been recognized from prehistoric days because of its excessive nutritive value, pleasant aroma, and textual properties. *Ghee* is viewed as an energy rich food that is rich in essential fatty acids, fat soluble vitamins and growth promoting factors. It has been accepted as best fat to other fats, for its better digestibility and anti-cancer properties The anti-oxidant properties of Ghee help to increase HDL level and decrease LDL level in blood.[2]

On the other hand, *Ghee* has been associated for the increasing prevalence of Cardio Vascular Diseases, Obesity, Diabetes Mellitus and Stroke for several decades. The purpose of this review is to dispel the common misconception among the general population that the consumption of ghee leads to hyperlipidaemia and to prove that Metabolic Syndrome can be effectively managed with the use of medicated *Ghrtam*.

DEFINITION

According to National Cholesterol Education Program (NCEP, 2002) Adult Treatment Panel III definition, Metabolic Syndrome is present if three or more of the following five criteria are met:[3]

- Waist circumference over 102cm (40 inches)-men;

88cm (35 inches)-women

- Blood pressure over 130/85mm Hg,
- Fasting triglyceride level over 150 mg/dl,
- Fasting HDL cholesterol < 40mg/dl(men) or <50mg/dl(women)
- Fasting blood sugar over 100mg/dl

PROBABLE PATHOGENESIS OF METABOLIC SYNDROME

Insulin resistance (IR) and visceral adiposity are the core defects underlying the pathophysiology of MS. Environmental and lifestyle factors such as consumption of excess calories and physical inactivity are the major contributors. Age, ethnicity, genetics, chronic inflammation, hormone imbalance, dysregulation of adipose tissue derived cytokines also makes the pathophysiology more complicated.

Insulin is a powerful anabolic hormone which helps in the metabolism of fat, carbohydrate, and protein. In IR, the target tissues (muscle, liver, fat) fail to respond to insulin leading to compensatory hyperinsulinemia. IR in adipose tissue results in increased circulating Free Fatty Acids (FFA) that promotes gluconeogenesis and lipogenesis. Hepatic IR results in increased triglyceride synthesis and apolipoprotein B production causing increased triglyceride-rich low-density lipoprotein (LDL) and reduction in HDL cholesterol. IR and hyperinsulinemia may over activate the sympathetic nervous system, increase sodium reabsorption in the kidney and decrease vasodilation contributing to the development of hypertension.[1]

LIPID METABOLISM IN METABOLIC SYNDROME

Lipids or fatty acids are important components of the human body and have multiple functions in both health and disease.

Insulin resistance is considered as the main hypothetical cause for MS. Some scholars opines that the formation of IR precedes the deficit of essential Polyunsaturated Fatty Acids (PUFA)in the cells. The reason behind this may be a disturbance of their active receptor (apo B/100) transport of lipoproteins.[4] Endogenous fatty acid deficiency in cells lead to change of phospholipids, fatty acid composition and physicochemical properties of plasma membrane, which may lower their liquid, breaks the functioning of insulin receptor and glucose transport systems. The blockage of receptor transfer of fatty acids results in increased passive

absorption of non-esterified free fatty acids by cells.[5,6,7] This activates lipolysis and forms hyperinsulinemia further enhance to peripheral insulin resistance.[8]

The PUFA depletion in the cell membrane causes the dysfunction of biologically active metabolites synthesis oxylipins (eicosanoids, prostaglandins, leukotrienes, thromboxanes) which are the key regulators of endothelial function, immunocompetent cells, platelets.[9] The disturbance of eicosanoids synthesis and its imbalance in the body causes chronic inflammation, arterial hypertension, coronary heart disease, atherosclerosis, diabetes mellitus.[10,11] So starting from the pathology of Fatty Acid transport receptor leading to cellular deficiency of essential fatty acids and disturbance in eicosanoid synthesis there forms a vicious circle in the formation of MS.

AYURVEDIC UNDERSTANDING OF METABOLIC SYNDROME

The major component in metabolism related disorders is *Agnidushti. Kapha Dosha Vridhi* due to *Avyayama, Divaswapna*, excessive intake of *Madhura, Snigda, Guru* or *Kapha Vardhaka Ahara* causes *Medodhatvagnimandya* resulting in excessive increase of *Medodhathu*. The raised *Medodhathu* in the form of *Abadha medas* circulates with *Rasa* and *Raktha dhathu* causing the raised level of lipids (elevated LDL and triglyceride) which may also affect the formation of *prasada medas*(low HDL). Increased *Medo dhathu* in *Kleda* form reaches the *Basti* and is excreted through urine causing *Dhathukshaya* resulting in *Prameha (*Diabetes Mellitus*)*. *Abadha medas* gets deposited in vessels and is responsible for *srotholepa* leading to *Dhamani Prathichaya* (Atherosclerosis) which may result in *Vyanabala Vaishmaya* (Hypertension). Obesity creates all conditions of *Medoroga* with *Vyanabala vaishamya* which simulates with Metabolic Syndrome.

ROLE OF *GO GHRTAM* IN THE PREVENTION OF METABOLIC SYNDROME

PUFA deficiency in cells is one of the reasons for causing IR. Cow's ghee is rich in beneficial compounds, including polyunsaturated fattyacids(PUFA) like omega-3 and omega-6, monounsaturated fatty acids (MUFA) such as omega-7 and omega-9 and small amounts of fat-soluble vitamins (K2, A, D, E). These components contribute to its potential in anti-diabetic, anti-atherogenic, anti-hypertensive, immunomodulatory effects and play a significant role in preventing lipid peroxidation and safeguarding cells from its detrimental effects.[12]

Ghee's medium-chain fatty acids (MCFAs) differ from other fats in terms of absorption. These MCFAs are absorbed differently, as they are smaller and water-soluble, facilitating rapid absorption in the body.[13] The abnormalities of insulin receptors in target tissues are an important cause for IR. The increased lipophilicity of *Ghrtam* helps to bind the insulin receptors and facilitate normal metabolic regulation.

All these properties show the benefits of using Cow's Ghee in daily diet which helps in preventing the depletion of essential fatty acid composition in cells and their metabolites in the pathogenesis as well as in the management of MS.

ROLE OF *MEDICATED GHRTAM* IN MANAGING METABOLIC SYNDROME

In recent decades, Ghee has been associated with increased CAD risk due to its saturated fats and cholesterol. Some believe Ghee's high saturation and hypercholesterolemic potential make it unsafe in today's lifestyles, while others argue that not all saturated fats are the same, and Ghee's medium-chain triglycerides make it a neutral choice.[14,15]

Samprapti vighatana at the cellular level is the best treatment to uproot any disease. Hence it is mandatory to have a carrier that can facilitate the drug or its pharmacological properties to get into the cell. Cell membrane is made up of phospholipids which is lipid soluble. *Go Ghrtam* is considered superior owing to its special attributes ie, *Samskarasya Anuvarthanam* (It carries the properties of drugs without leaving its inherent properties). This quality of *Ghrtam* makes it an excellent vehicle for drug administration as it facilitates the dispersion of all medicinal properties to the deepest tissues making it a best catalytic agent.

Mandagni, Kapha medo dushti, Srotorodha & Vatakopa are the important factors involved in the pathogenesis of *Medoroga. Therefore Agnidipana, Amapachana, Kaphamedoanilapaha* and *Srothosodhana chikitsa* should be given. The use of medicated *Ghrtam* containing herbal drugs which possess properties such as *Katu, Tiktha, Kashaya* rasa, *Laghu, Ruksha guna, Ushna Virya, Katu Vipaka, and Kapha Vatahara* actions, can be effective in disrupting the pathogenesis. Some examples of such *Ghrtam* preparations include *Trayushnadi Ghrtam, Guggulu Tiktha Ghrtam, Triphala Ghrtam* etc.

Medicated *Ghrtam* may act at *Jatharagni* level and correct the functions of *Samanavayu, Pachaka pitta, Kledaka kapha* thereby correcting the digestion. *Agni Mahabhutha* predominance of *Ghrtam* may help to improve the liver function and correct the liver

enzymes. *Medo vridhi guna* of *Ghrtam* may increase the HDL cholesterol levels in blood and removes excess cholesterol from the body cells and transport it to liver. When excess *Medodhathu* gets eliminated and when optimum *Rasadi dhathus* are formed it may result in decreasing TGL level by improving the lipid metabolism. The reduction in *Atipravrutti* of *Medodhathu* may result in a decrease in abdominal size by reducing the deposition of *Medas* in *Udara pradesha* and may help in relieving the symptoms of *Medoroga*. The *Rasayana* effect of *Ghrtam* may help to maintain the quality of *Dhathus* formed thereby promote health and longevity by improving metabolism.

Before administering *Ghrtam* in *Santharpanajnya vikaras*, one must consider the essential factors: *Agni*, *Koshta*, *Prakruti*, *Vaya*, and *Kala*. For individuals who are excessively overweight, with an excess of *Kapha* and *Medas*, and those who lead a sedentary lifestyle should avoid taking *Ghrtam* in excess quantity. It is crucial to ensure that the *GoGhrtam* is processed with suitable ingredients and is timely administered after proper *Dipana pachana*, as otherwise it may lead to the formation of *Ama*.

CONCLUSION

The present review briefly outlines the potential benefits of incorporating medicated *Ghrtam* in the management of MS and underscore the significance of daily inclusion of *Go Ghrtam* in one's diet to help prevent the onset of MS. It also aims to establish that not all saturated fatty acids present in natural fats are alike and that they do not contribute to the development of atherogenic conditions.

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