

## CONCEPT OF DYSLIPIDEMIA IN AYURVEDA & ITS MANAGEMENT – A CONCEPTUAL STUDY

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### ABSTRACT

Dyslipidemia is one of the commonest presentation & major cause for various lifestyle disorders. The term “fat” may refer to lipids as well as the cells and tissue that store lipid (i.e., adipocytes and adipose tissue). “Lipid” is derived from ‘lipos’ which refers to animal fat or vegetable oil. Adiposity refers to body fat and is derived from ‘adipo’ referring to fat. Adipocytes and adipose tissue store the greatest amount of body lipids, including triglycerides and free cholesterol. Adipocytes and adipose tissue are active from an endocrine and immune standpoint. Adipocyte hypertrophy and excessive adipose tissue accumulation can promote pathogenic adipocyte and adipose tissue effects (adiposopathy), resulting in abnormal levels of circulating lipids with dyslipidemia being a major atherosclerotic coronary heart disease risk factor. These points towards the pathology of *Medas* in *Rasa* or *Rasa & Rakta*. The condition of *Rasagata Medas (Sneha) Vriddhi*, *Rasa Raktagata Medas (Sneha) Vriddhi*, *Medovriddhi*, *Medoroga* or *Medodosh*, *Ama Medodhatu* may be considered. *Agni* is responsible for all metabolic activities in the body. It is solely responsible for any increase or decrease of *Dosha*, *Dhatu* or *Mala*. When *Agni* is decreased, it will lead to various metabolic disorders at various levels and produces “*Ama*”.

**Keywords:** Dyslipidemia, *Agni*, *Rasagata Medas (Sneha) Vriddhi*, *Rasa Raktagata Medas (Sneha) Vriddhi*, *Medovriddhi*, *Medoroga* or *Medodosh*, *Ama Medodhatu*

### INTRODUCTION

Excessive body fat and its metabolic consequences are worldwide epidemics<sup>1</sup>. In the United States alone, more than two-thirds of adults are overweight or obese<sup>2</sup>. The adverse health consequences of excessive body fat is especially correlated to the dysfunctional deposition of adipose tissue, in that abdominal adiposity measures are directly and significantly associated with mortality<sup>3</sup>.

Principal among metabolic co-morbidities associated with excessive body fat is dyslipidemia. Results from national surveys suggest that dyslipidemia are the most common co-morbidities associated with a range of

body mass indices (BMI), with substantial increases found with increased body weight<sup>4</sup>.

The association between body fat mass and metabolic disease is not absolute, and the diagnosis of obesity is often a poor surrogate for the adverse health risks of increased body fat<sup>5</sup>. Various “obesity paradoxes” describe circumstances wherein an increase in body fat is not always associated with an increase in risk for cardiovascular disease (CVD). In fact, excessive body fat is sometimes associated with decreased CVD risk<sup>6</sup>. These apparent obesity paradoxes can often be explained by assessing the pathogenic potential of adipose

tissue based upon adipocyte.

## **DYSLIPIDEMIA**

### **DEFINITION**<sup>7</sup>

Dyslipidemia is elevation of plasma cholesterol, triglycerides, or both, or a low high-density lipoprotein level that contributes to the development of atherosclerosis.

It is one of the commonest presentation & major cause for various lifestyle disorders. This can be prevented or reversed if detected timely & treated. The conventional methods of management are not very effective in preventing or reversing the pathology of Dyslipidemia.

### **CAUSES OF DYSLIPIDEMIA**

- PRIMARY (GENETIC)
- SECONDARY (LIFESTYLE AND OTHER)

#### **PRIMARY CAUSES:**

Primary causes are single or multiple gene mutations that result in either overproduction or defective clearance of Triglycerides and LDL cholesterol, or in underproduction or excessive clearance of HDL

#### **SECONDARY CAUSES:**

- A sedentary lifestyle with excessive dietary intake of saturated fat, cholesterol, and transfats.
- Diabetes mellitus
- Alcohol overuse
- Chronic kidney disease
- Hypothyroidism
- Primary biliary cirrhosis and other cholestatic liver diseases
- Drugs, such as thiazides, -blockers, retinoids, highly active antiretroviral agents, cyclosporine, tacrolimus, estrogen and progestins, and glucocorticoids.
- Secondary causes of low levels of HDL cholesterol include cigarette smoking, anabolic steroids, HIV infection, and nephrotic syndrome.

#### **SIGNS AND SYMPTOMS**

- ✓ Dyslipidemia itself usually causes no symptoms but can lead to symptomatic vascular disease, including coronary artery

disease (CAD), stroke, and peripheral arterial disease.

- ✓ High levels of Triglycerides (> 1000 mg/dL [ $> 11.3$  mmol/L]) can cause acute pancreatitis.
- ✓ High levels of LDL can cause arcus corneae and tendinous xanthomas at the Achilles, elbow, and knee tendons and over metacarpophalangeal joints.
- ✓ Patients with the homozygous form of familial hypercholesterolemia may have the above findings plus planar or tuberous xanthomas.
- ✓ Planar xanthomas are flat or slightly raised yellowish patches.
- ✓ Tuberous xanthomas are painless, firm nodules typically located over extensor surfaces of joints.
- ✓ Patients with severe elevations of Triglycerides can have eruptive xanthomas over the trunk, back, elbows, buttocks, knees, hands, and feet.
- ✓ Patients with the rare dysbetalipoproteinemia can have palmar and tuberous xanthomas.
- ✓ Severe hypertriglyceridemia (> 2000 mg/dL [ $> 22.6$  mmol/L]) can give retinal arteries and veins a creamy white appearance (lipemia retinalis).
- ✓ Extremely high lipid levels also give a lactescent (milky) appearance to blood plasma.
- ✓ Symptoms can include paresthesias, dyspnea, and confusion.

#### **DIAGNOSIS**

Serum lipid profile (measured total cholesterol, TG, and HDL cholesterol and calculated LDL cholesterol and VLDL).

Dyslipidemia is suspected in patients with characteristic physical findings or complications of dyslipidemia (eg, atherosclerotic disease).

- Primary lipid disorders are suspected when patients have;
  - Physical signs of dyslipidemia,

- Onset of premature atherosclerotic disease (at <60 yr)
- A family history of atherosclerotic disease
- Serum cholesterol > 240 mg /dL.
- Dyslipidemia is diagnosed by measuring serum lipids.
- Routine measurements (lipid profile) include total cholesterol (TC), TGs, HDL cholesterol, and LDL cholesterol.

### METABOLIC SYNDROME<sup>8</sup>

- Clinical diagnosis requires more than 3 of the following risk factors:
  - Abdominal Obesity (waist circumference): Men > 102 cm (40 in), Women > 88 cm (35 in)
  - Elevated Triglycerides > 150 mg/dL
  - Reduced HDL cholesterol: Men < 40 mg/dL, Women < 50 mg/dL
  - Hypertension > 130/86
  - Impaired fasting glucose > 100 mg/dL

### WHAT INCREASES RISK?

Several factors can make you more likely to develop high cholesterol:

- A diet high in saturated fats and cholesterol
- A family history of high cholesterol
- Being overweight or obese
- Getting older

### CHOLESTEROL<sup>9</sup>

Cholesterol is a fatty substance manufactured in the liver and is carried throughout the body in the bloodstream.

### HIGH CHOLESTEROL CONCERNS

- Major risk factors for coronary artery disease, heart attacks, and strokes.
- Leads to a buildup of plaque that narrows the arteries.

### TOTAL CHOLESTEROL

- Total cholesterol measures the combination of LDL, HDL, and VLDL in the bloodstream.
- VLDL is a precursor of LDL, the bad cholesterol.
- A total cholesterol score of < 200 is considered healthy in most cases.

**TABLE NO - 1 SHOWING LEVELS OF LIPIDS**

	DESIRABLE	BORDERLINE	HIGH RISK
TOTAL CHOLESTEROL	< 200 mg/DL	200-239 mg/Dl	>240mg?DL
LDL-C	> 130mg/DL	130-159mg/DL	160-189 mg/DL
HDL –C MALE FEMALE	<40mg/DL <50mg/DL	35-45 mg/DL	
TRIGLYCERIDES	150mg/DL	150-199 mg/DL	200-499 mg/DL

### LIPOPROTEIN<sup>10</sup>

Lipoproteins – macromolecules that transport hydrophobic lipids (triglycerides, cholesterol & fat-soluble vitamins) through body fluids (plasma, interstitial fluid, and lymph) to and from tissues.

Lipoproteins contain a core of hydrophobic lipids (triglycerides and cholesteryl esters) surrounded by hydrophilic lipids (phospholipids, unesterified cholesterol) and proteins that interact with body fluids.

### LOW DENSITY LIPOPROTEINS

- Most of the cholesterol in the blood is carried by proteins called low density lipoproteins or LDL or the bad cholesterol
- LDL combines with other substances to clog the arteries.
- A diet high in saturated fats and trans fats tends to raise the level of LDL cholesterol.
- For most people, an LDL score below 100 is healthy

### HIGH-DENSITY LIPOPROTEINS

- Up to a third of blood cholesterol is carried by high-density lipoproteins or HDL or the good cholesterol.
- HDL helps remove bad cholesterol, preventing it from building up inside the arteries.
- The higher the level of HDL cholesterol, the better.

### TRIGLYCERIDES

- The body converts excess calories, sugar, and alcohol into triglycerides, a type of fat

that is carried in the blood and stored in fat cells throughout the body.

- People who are overweight, inactive, smokers, or heavy drinkers and those who eat a very high carbohydrate diet tend to have high triglycerides
- A triglycerides score of 150 or higher puts at risk for metabolic syndrome, which is linked to heart disease and diabetes.

**TABLE NO-2 SHOWING RISK CLASSIFICATION OF SERUM TRIGLYCERIDES <sup>11</sup>**

Normal	<150 mg/Dl
Borderline high	150–199 mg/dL
High	200–499 mg/dL
Very high	≥500 mg/Dl

### TREATMENT <sup>12</sup>

- Risk assessment by explicit criteria
- Lifestyle changes (e.g. exercise, dietary modification)
- For high LDL cholesterol, statins, sometimes bile acid sequestrants, ezetimibe, niacin, and other measures
- For high Triglycerides, niacin, fibrates, omega-3 fatty acids, and sometimes other measures

### GENERAL PRINCIPLES

The main indication for dyslipidemia treatment is prevention of atherosclerotic cardiovascular disease (ASCVD), including acute coronary syndromes, stroke, transient ischemic attack, or peripheral arterial disease presumed caused by atherosclerosis. Treatment is indicated for all patients with ASCVD (secondary prevention) and for some without (primary prevention).

- Medications/Drugs
- Statins
- Non-Statins

### CONCEPTUAL ANALYSIS OF DYSLIPIDEMIA IN AYURVEDA

- Word Dyslipidemia- considered as,

- Dys (disordered) + lipid (fat) + emia (in the blood) - disordered lipids in the blood
- This indicates that there is abnormal fat (*Medas / Sneha*) in blood (*Rakta*).
- *Medas* is *ashraya* to *Kapha*. All *asthaya dhatus* travel throughout the body through *Rasa-Raktavaha srotas* propelled by *Vyana vata*.
- This points towards the pathology of *medas* in *rasa* or *rasa & rakta*. Hence the following conditions may be considered
  - ❖ *Rasagata Medas (Sneha) Vriddhi*
  - ❖ *Rasa Raktagata Medas (Sneha) Vriddhi*
  - ❖ *Medovriddhi*
  - ❖ *Medoroga or Medodosha*
  - ❖ *Ama Medodhatu*.

### DERANGEMENT OF METABOLISM <sup>13</sup>

- *Agni* is responsible for all metabolic activities in the body.
- It is solely responsible for any increase or decrease of *Dosha, Dhātu* or *Mala*.
- The vitiation of *Agni* has serious impact on health at various levels depending on type of *Agni* involved.
- When *Agni* is decreased, it will lead to various metabolic disorders at various levels

and produces “Ama” (partially digested molecules) i.e., Agni fails to convert the *Vijatiya* (non-assimilable) *Dravyas* into *Sajatiya* (assimilable) ones and the end products cannot be assimilated by the *Dhatu*s.

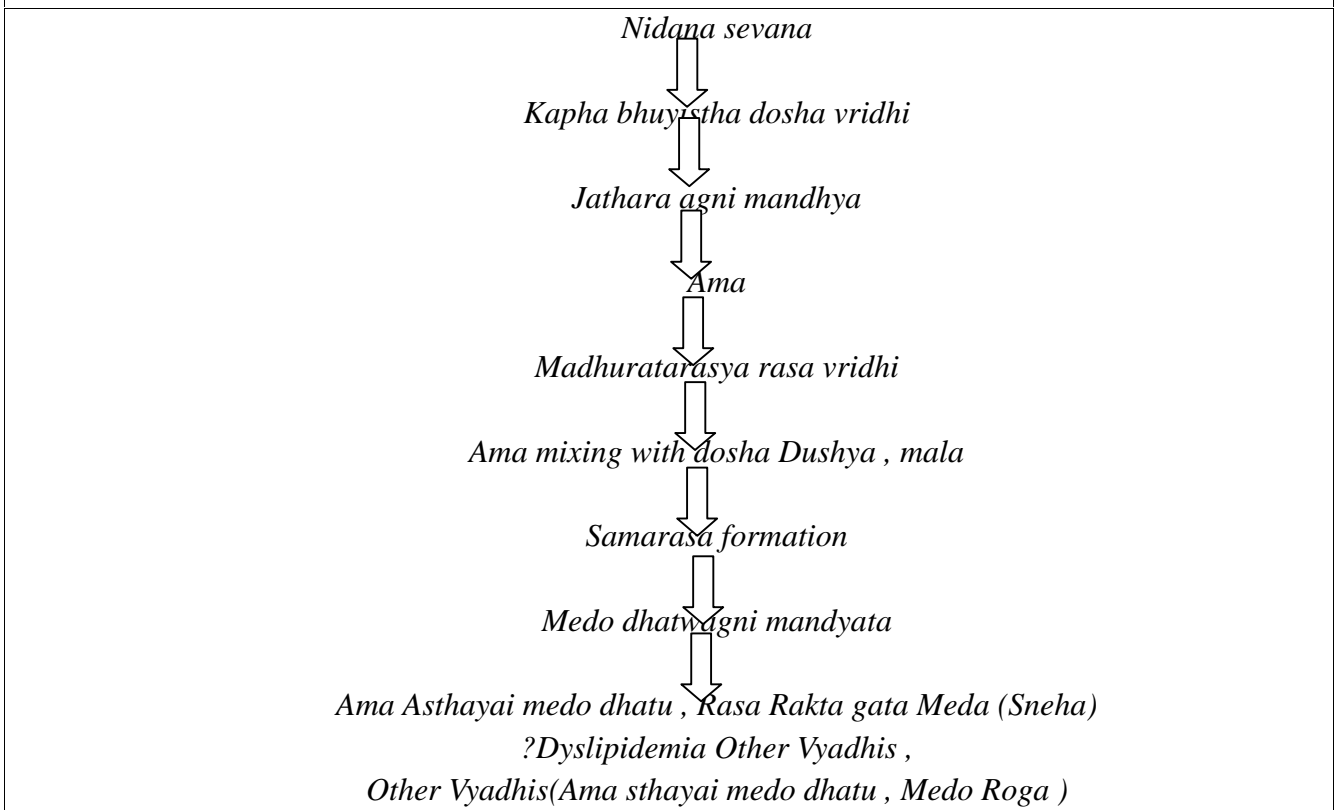
- Such products are dangerous to body cause various conditions according to their presence at various physiological levels.
- *Agnimandya* at *dhatvagni* level (one or more), then the particular *poshya dhatu*s cannot assimilate their *poshaka bhaga* present in the circulating *ahara rasa*.
- Such *poshaka dhatu*s will be accumulated in *ahara rasa* in abnormal quantities or further get accumulate at abnormal sites.
- This sort of process initially can be called *leenatwa of ama in dhatu*s. Such *leenatwa*

upon continuous pathological process leads to different disorders.

- The above-mentioned pathology when occurs related to *snehansh*, then the homologues nutrients which should nourish the *sneha bhava* in the *sharira* which remains in *rasa dhatu* itself.
- This leads to excess accumulation of abnormal quantities of *poshaka snehansh in rasa & rakta*.
- This condition can be referred to as *Dyslipidemia*.
- This is because the *poshaka snehansh* cannot be assimilated into *Sthayi medo majjyadi dhatu*.
- The consequence of such increase in *Poshaka snehansh* leads to conditions such as *dhamani pratichaya, hiradya upalepa*.

**SAMPRAPTI**

**TABLE NO -3, SHOWING PROBABLE SAMPRAPTHI**



**Table no.4 SAMPRAPTI GHATAKA**

DOSHA	<i>Kapha pradhana tridosha</i>
DUSHYA	<i>Rasa, Rakta &amp; meda dhatu</i>
AGNI	- <i>Jataragni, rasa, rakta &amp; meda dhatvagni</i>
AMA	<i>Tajjanya Ama</i>



<b>SROTAS</b>	<i>Rasa, Rakta &amp; Medovaha</i>
<b>SROTO DUSHTI -</b>	<i>Sanga (later stage) – As this particular stage is prasaravastha</i>
<b>ROGAMARGA</b>	<i>Bahya or Abhyantara (Based on Vyadhi)</i>
<b>UDBHAVA STHANA</b>	<i>Amashaya</i>
<b>SANCHARA STHANA –</b>	<i>Sarvashareera</i>
<b>VYAKTASTHANA –</b>	<i>Sarvashareera (Sthoulya), Basti (Prameha), Hridaya (Hridroga), Mastikhya (Pakshaghata)</i>

### **CHIKITSA<sup>14, 15</sup>**

- ✓ **NIDHANA PARIVARJANA** – Avoid *Kapha kara aahara vihara*
- ✓ **DINACHARYA** like – *Sanana, Udawartana, Tambula sevana*
- ✓ **RITUCHARYA**; *Ahara & vihara, Ritu sodhana*
- ✓ Applicable Treatment Principles based on degree of *ama* and *bala* of doshas

#### ❖ **Langhana ; Alpa Bala Dosha**

#### ❖ **Langhana- Pachana ; Madhyama Bala Dosha**

#### ❖ **Dosha avasechana ; Bahu Dosha**

**RUKSHANA** - As in dyslipidemia patients will be coming under criteria of *Mamsala, Medura, Bhurisleshma and vishamagni* so *Sneha poorva Rookshana* is done.

*Rookshana can be broadly classified as*

- **Bahya Rookshana** – in form of *Udgharshaana with Kolakulathadi churna, Triphala churna etc*
- **Abhyantara Rookshana** in form of *kashya panam (amrtoaram , panchakolam)*

*Arishta pana (abhyarishta ,takraishta ) and consumption of Churna kalpana (panchkola ,shaddharana ,vaiswanara , hingwastaka )*

- *Rooksha annapana, Yava anna bhojana, Takra pana*

### **SHODHANA**

- ✓ *Vamana Karma, Virechana karma*
- ✓ *Teekshna basti like Kashara basti / lekhanasthi basti*

### **SHAMANA CHIKITSA**

Oushadhas having *guna* and *karma* of

- *Katu Tikta Rasa*
- *Ushna Veerya*
- *Kapha Vata Shamana*
- *Ruksha, Tikshna,*
- *Chedaniya Dravyas Srotosodhana, Lekhana Dravyas*

**Ekamoolika prayoga** - *Shilajathu, Chitraka, Guggulu, Gomutra*

**Churna kalpana** - *Vidangadi Churna Gomutra haritaki Churna*

**Kashaya kalpana**- *Asanadi gana Kashaya, Varasanadi Kashaya, Guggulu tiktakam Kashaya*

**Guggulu kalpana** - *Navaga Guggulu, Vyo-shadi Guggulu, Saptavimsati Guggulu Kanca-nara Guggulu, Triphala Guggulu*

**Lehya kalpana** - *Gomutra haritaki*

**Rasa Aushadis**- *Loha Bhasma, Vanga bhasma, Navayasa loha curna, Vidangdi loha*

**Rasayana Prayoga**- *Bhallathaka Rasayana, Lasuna Ksheerapaka Vardhamana Pippali With Madhu, Siva gutika*

### **RESEARCH UPDATE**

A research carried out on *Lekhana Basti* was highly effective in reducing serum lipid profile, in particularly serum cholesterol level which was statistically highly significant. On comparison Group A (*Lekhana Basti*) showed better result than Group B (*Atorvastatin*) statistically<sup>16</sup>.

Another research carried out by Dr. Vasanth Patil et al on standardisation of *Snehapana* revealed that there was increase and decrease of triglyceride and LDL levels after *Vire-*

chana, increase in levels was due to *Avara shuddhi* and in other group became to normal level due to proper *Shodhana*, And also discussed about importance of *Rookshana* before *Snehana* to avoid increase of Lipids<sup>17</sup>.

## DISCUSSION

- ✓ Dyslipidemia is condition with abnormally elevated levels of any one or all lipids in the blood.
- ✓ Dyslipidemia is an established and modifiable risk factor for coronary artery diseases.
- ✓ There is no direct reference of dyslipidemia in *ayurveda*, but the symptoms of dyslipidemia can be analysed on the principles of *Vikriti vignana*.
- ✓ The analysis suggests *Rasagata Medas (Sneha) Vriddhi, rasa raktagata medas (Sneha) Vriddhi*.
- ✓ It also points to *Aama, vikruta Kapha, Kleda and Avaranaajanya* phenomenon.
- ✓ *Medoroga, Atisthoulya are Santarpanotha vyadhis* similarly *sedentary* life style and heavy fatty diet is main cause for dyslipidemia.
- ✓ Our *Acharyas* have suggested *Rukshana* followed by *Shodhana Chikitsa*. In *Santarpanajanya vyadhi*.
- ✓ The *Chikitsa* must be focused on alleviating *Vata and Kapha dosha* and also impaired *Agni*.
- ✓ Following the explanations of our ancient *acharya's* will provide a platform to understand and treat dyslipidemia through *ayurvedic* medicaments.

## CONCLUSION

- The causes for primary dyslipidemia can be considered in *Ayurveda* under the concept of *beeja dushti*, and secondary under *Prasaravasta* of various *kapha-vata pradosha vikaras*.

- The equilibrium between *doshas, dhathus, malas and agni* helps in preventing the occurrence of the pathology.
- When once the pathology is started, it is important to identify and understand the condition properly through *ayurvedic* principles.
- Following the *Ritu charya, Dinacharya and Sadvrutta* help in preventing the disease.
- *Nidana parivarjana, Shodhana, Shamana and Rasayana* measures helps in combating the disease.
- Timely intervention in the early stages of *kriyakala* will prevent progression into further stages like *sthanasamshraya, vyakta and bheda*. Thus preventing disease like *Hridroga, Vatavyadhi, Sthoulya, Prameha* etc.

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**Source of Support:** Nil

**Conflict of Interest:** None Declared