



Review Article

ANALYSIS OF DYSLIPIDEMIA AS PER AYURVEDA AND ITS MANAGEMENT

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ABSTRACT

Dyslipidemia refers to any abnormality in the level of circulating plasma lipids. It is an extremely significant condition, majorly because of its contribution to atherogenesis. It is an independent and modifiable risk factor for CAD and stroke. More than half of global cases of ischemic heart disease are associated with dyslipidemia. Quality of care for dyslipidemia is suboptimal in general and variable by cardiovascular disease risk group, ethnicity and gender. In modern medicine, there are effective dyslipidemic drugs which give rapid relief, but may cause some long term side effects. So there is a need for safe alternative treatment which may be effective in reducing lipid level, for prolonged use. In Ayurveda, dyslipidemia can be considered as a condition in which *Kapha*, *Medas* and *Rasa* are pathologically deranged due to *Ama*. There is defective *Medo dhatu poshana* due to *Dhatwagnimandhya* and formation of *Ama* at the level of *Medo dhatu*. It can be considered as presumable level of stage of *Samprapti* or a morbid state which may cause disease, but not attained a full status of disease. *Nidanas* include *Beejadushti*, *Ahara-vihara-vikara* and *Manasika nidanas*. Lipid profile can be brought back to normal by correcting *Agni* and ensuring proper *Dhatuparinama*. Treatment modalities include *Nidana parivarjana*, *Sodhana*, *Samana*, *Rasayana* and following *Pathyapathya*. Drug having *Kaphamedohara*, *Deepana*, *Pachana*, *Ruksha* and *Lekhana* property is useful to treat this clinical condition.

INTRODUCTION

The rapid rise of non communicable diseases represent one of the major challenges to global development in the new century. Each year more than 15million people die from NCD; 85% of these 'premature' deaths occur in low and middle income countries. According to WHO's projections, the total annual number of deaths from NCDs will increase to 55 million by 2030.[1] Global economic and social development is threatened by this emerging challenge. Knowledge of NCD risk factors is important for predicting the burden of chronic disease in populations and for identifying potential interventions to reduce such burden.

Dyslipidemia refers to the imbalance of lipids such as cholesterol, low-density lipoprotein cholesterol (LDL-C), triglycerides and high density

lipoprotein (HDL) either from organic or nonorganic causes.[2] It is an extremely important condition, principally because of its contribution to atherogenesis and it is an independent and modifiable risk factor for CAD.[3,4] Incidence of dyslipidemia is increasing in many developed and developing countries mainly due to westernization of diet and sedentary life style. More sedentary work with less energy expenditure came with the development of newer technologies, shift in the job pattern and rapid pace of urban life.

According to the ICMR-INDIAB Study, over three-fourth (79%) of the general adult population covered in the survey have abnormalities in at least one of the lipid parameters with no urban rural difference. Even the youngest age group has high rates of dyslipidemia.[5] The annual number of deaths from CVD in India is projected to rise from 2.26 million (1990) to 4.77 million (2020).[6] Dyslipidemia is associated with major part of ischemic heart disease. Another major consequence of dyslipidemia, the stroke remains the second most common cause of death after ischemic heart disease.[7]

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Quality of care for dyslipidemia is suboptimal in general and variable by cardiovascular disease risk group, ethnicity and gender. A patient with known atherosclerotic cardiovascular disease who has a predicted risk of major vascular events of 45% and of hard cardiovascular events of 30% within the next 10 years, lowering LDL-C level by 1mmol/L would be expected to result in absolute risk reductions of approximately 10% and 7%, respectively.^[8] For every 10% lowering of cholesterol, CHD mortality reduce by 13%.

Dyslipidemia

Definition

Dyslipidemia refers to the imbalance of lipids such as cholesterol, low-density lipoprotein cholesterol (LDL-C), triglycerides and high density lipoprotein (HDL) either from organic or nonorganic causes.^[9]

Causes

1. Primary
2. Secondary

Primary Dyslipidemia

Presence of excess levels of lipids in a patient's blood sample in the absence of other underlying conditions is called primary dyslipidaemia. The elevated lipid fraction is either cholesterol or triglycerides or both. Single or multiple gene mutations are the primary causes.

Secondary Dyslipidemia

Causes

- Obesity
- Diabetes mellitus
- Hypothyroidism
- Renal disorders
- Liver disorders
- Cushing's syndrome
- Drug administration: Many drugs like thiazide diuretics, beta blockers and estrogens have an

Risk classification of serum cholesterol, lipoproteins and triglycerides

Table 1: Adult Treatment Panel III Classification of Total Cholesterol

Desirable	< 200mg/dL
borderline high	200 - 239mg/dL
High	> 239mg/Dl

Table 2: ATP III Classification of LDL Cholesterol

Optimal for people at very risk of heart disease	<70mg/dL
Optimal for people at risk of heart disease	<100mg/dL
Near/above optimum	100-129mg/dL
Borderline high	130-159mg/dL
High	160/189mg/dL
Very high	>189mg/dL

impact on lipid metabolism and can result in significant alterations in the lipoprotein profile.

Clinical Presentation of Dyslipidemias

High cholesterol has no specific symptoms or signs in most of the patients. The vast majority of patients with lipid abnormalities are detected by the laboratory, either as a part of the workup of a patient with cardiovascular disease or as part of a preventive screening strategy.

Major clinical presentations include the following

- ❖ **Xanthomatosis:** Deposits of cholesterol seen as yellowish nodular masses which vary in size from few millimeters to several centimeters.
 - Excessive high levels of chylomicrons or VLDL particles may cause eruptive xanthomas.
 - High LDL concentration result in tendinous xanthomas.
- ❖ **Xanthalesma:** Yellowish plaque like lesions seen on the medial aspect of upper and lower eye lids.
- ❖ **Corneal arcus:** Greyish ring will appear along the periphery of cornea. Premature occurrence of arcus has been associated with hypercholesterolemia especially LDL.
- ❖ **Lipemia retinalis:** Cream coloured blood vessels in the fundus. It is seen with extremely high triglyceride levels.

Dyslipidemia Screening

- ✓ Testing cholesterol every five years for people aged 20 years or older is recommended by 'The American Heart Association'.
- ✓ Guidelines for the screening and management of lipid disorders have been provided by an expert Adult Treatment Panel (ATP) convened by the National Cholesterol Education Programme (NCEP) of the National Heart Lung and Blood Institute.^[10]
- ✓ As per The NCEP ATPIII guidelines published in 2001, a 12 hour fast measurement of plasma levels of cholesterol, triglyceride, LDL-C and HDL-C is recommended for all adults over age 20

Table 3: ATP III Classification of HDL Cholesterol

Poor	< 40mg/dL
Better	40-59mg/dL
Best	>59mg/dL

Table 4: ATP III Classification of Triglycerides

Normal	< 150mg/dL
Borderline high	150-199mg/dL
High	200-499mg/dL
Very high	>499mg/dL

Role of Lipids and Lipoproteins in Atherogenesis

On taking high fat, high cholesterol diet, adhesion of monocytes to arterial endothelium occurs at first. Later monocytes penetrate the endothelium, accumulate in the sub endothelial space and engulf lipid and lipid laden foam cells. The endothelial layer is disrupted leading to platelet adhesion and aggregation which release potent growth factor that stimulate smooth muscle cell proliferation and connective tissue accumulation. Thus atherosclerotic plaque develops.

Relation between lipids and CHD

A positive relationship with the plasma cholesterol levels and CHD was revealed in epidemiological, clinical, experimental and trial studies. The risk increases progressively with higher values of serum total cholesterol. Positive correlation between the levels of blood LDL cholesterol and heart disease is much more significant. In contrary, high levels of HDL cholesterol have been associated with a decreased risk for CAD. Low levels of HDL often reflect obesity, smoking, lack of exercise or impaired glucose tolerance. High levels of triglycerides with low levels HDL seem to have an increased risk.

Treatment^[11]

Treatment of dyslipidemia include

✓ **Lifestyle Modification**

It includes diet, exercise, weight management, evaluation of alcohol consumption, smoking cessation and nutritional supplement.

✓ **Dietary Treatment of Dyslipidaemia**

It is the first step in the management of all cases. The National Cholesterol Educational Programme of London describes a step-one diet, which is appropriate to the population as a whole, together with other life-style modifications. A more restrictive step –two diet reserved for specific cholesterol lowering in those who fail to achieve satisfactory lipid reduction with more modest dietary changes.

✓ **Pharmacological Management of Dyslipidaemia**

Based on the assessment of cardiovascular risk factors and cholesterol level, classification of patients into following groups is possible.

- Those with Established Coronary Heart Disease.
- Those with multiple risk factors or with genetic hyperlipidaemia.
- Those with isolated asymptomatic hyperlipidaemia.

These groups represent a gradient of absolute risk of a coronary event and therefore of the absolute benefit to be achieved by cholesterol reduction.

There are several classes of hypolipidemic drugs. choice of drug will depend on the patient's cholesterol profile, cardiovascular risk, and the liver and kidney functions of the patient. Classes of hypolipidemic drugs include.

- ✓ HMG CoA reductase (3-hydroxy 3-methyl glutaryl CoA reductase) inhibitors (Statins)
- ✓ Fibric acid derivatives
- ✓ Bile acid sequestrants (resins)
- ✓ Nicotinic acid
- ✓ Niacin
- ✓ Probucol
- ✓ Fish oils
- ✓ Lifibrol
- ✓ Other non-pharmacologic non-dietary treatment modalities like gene therapy and plasmapheresis are also in practice for severe hypercholesterolemia.

Analysis of Dyslipidemia in Ayurvedic View

Dyslipidemia as such is not mentioned in Ayurvedic texts and it cannot be correlated to a particular disease mentioned in classical texts. It can be considered as presumable level of stage of *Samprapti* or a morbid state which may cause disease, but not attained a full status of disease.

Nidana

The whole of the etiological components of lipid disorder can be included among following headings.

- ❖ *Beejadushti*
- ❖ *Ahara - vihara - vikara*
- ❖ *Manasika nidanas*

Beejadushti

Beejadushti predisposes the individual to the disease by inherent *Medodhatwagnimandya* and defective origin of *Rasavahasrothas* and acts as the site of *Srotovaigunya* that lead to subsequent *Sthanasamsraya* under favourable circumstances. Even if a man is taking normal food and following normal life style, he may get affected with dyslipidemia due to particular genetic makeup. Primary hypercholesterolemia can be included under “*Adibalapravritha rogas.*”^[12] For patients with *Beejadushti nidana*, the impairment of *Medodhatu parinama* will be inherent in the individual.

Aharaja (Dietary Causes)

- Excessive involvement in foods having the qualities like *Snigdha*, *Guru*, *Picchila*, *Sheeta* and *Madhura*, *Amla*, *Lavana Rasa* results in disorders related to *Kapha* and *Medas*. *Medyanam cha atibhakshanam* cause vitiation of *Medas*. *Abhishyandi* is the *Guna* that produces *Kledana* in the *Srothases*.
- In the present era, the food that are too heavy and difficult to digest, such as packaged, frozen, canned and fried food, prepared meat, pre-spiced meat, use of pre-cooked oil, commercial mayonnaise, ketchup, crackers, cookies, doughnuts can be included in above description.
- *Madhurarasadravyas* are *Prithvi* and *Ap Bhuta* predominant, hence when consumed in excess, will tend to aggravate similar *Dhatu* in the body like *Kaphadosha* and ultimately *Medodhatu*.
- *Dadhi*, *Navadhanya*, *Navamadya*, *Anoopamamsa*, and milk all have *Kledana* and *Abhishyandi* property. By *Pichila* and *Guru Guna* of *Abhishyandi* drugs, it causes *Gourava* of body by blocking the *Rasavahasrothas*. This is relevant in dyslipidemia and CAD.
- *Virudha ahara* causes *Utklesha* of *Doshas* and stays disparate to *Dhatu*. When this is occurring in the body for long, it can hamper the normal *dhatu* metabolism resulting in hyperlipidaemia. Especially *Virudha* involving oils and fat like use of pre-cooked oil can directly cause *Dhatwagnimandya* in *Medodhatu*.

Vihara (Lifestyle)

- Sedentary lifestyle is the basic attributing factor for *Kaphamedodhushti*. Proper exercise is necessary for maintaining *Agnideepthi* and health.
- *Avyayamam*, *Divaswapnam* and *Atiseva* of *Varuni* cause *Medovaha sroto dushti*.
- Persons, who dislike any kind of activity (*Chestadveshi*), abstain from any kind of exercise (*Mruja-vyayamavarjanam*), habituate day sleep, comfort in single posture at one place for long (*Ekasthanaasanarati*) will lead to increased state of *Kapha*, *Meda* and *Kleda* in the body.^[13]

Manasika karanas (Psychological factors)

- “*Chintyanam Cha Ati Chintanat*” ie, extreme emotional variation is one of the causes of *Rasavahasrothodushti* which confers the stress factor of the disease dyslipidemia.^[14] As per *Charakacharya*, even the food taken in proper quantity, following *Ahara Vidhivisheshayatana*, will not digested properly if the person is affected by worry, grief, fear, anger, unhappiness and lack of sleep.

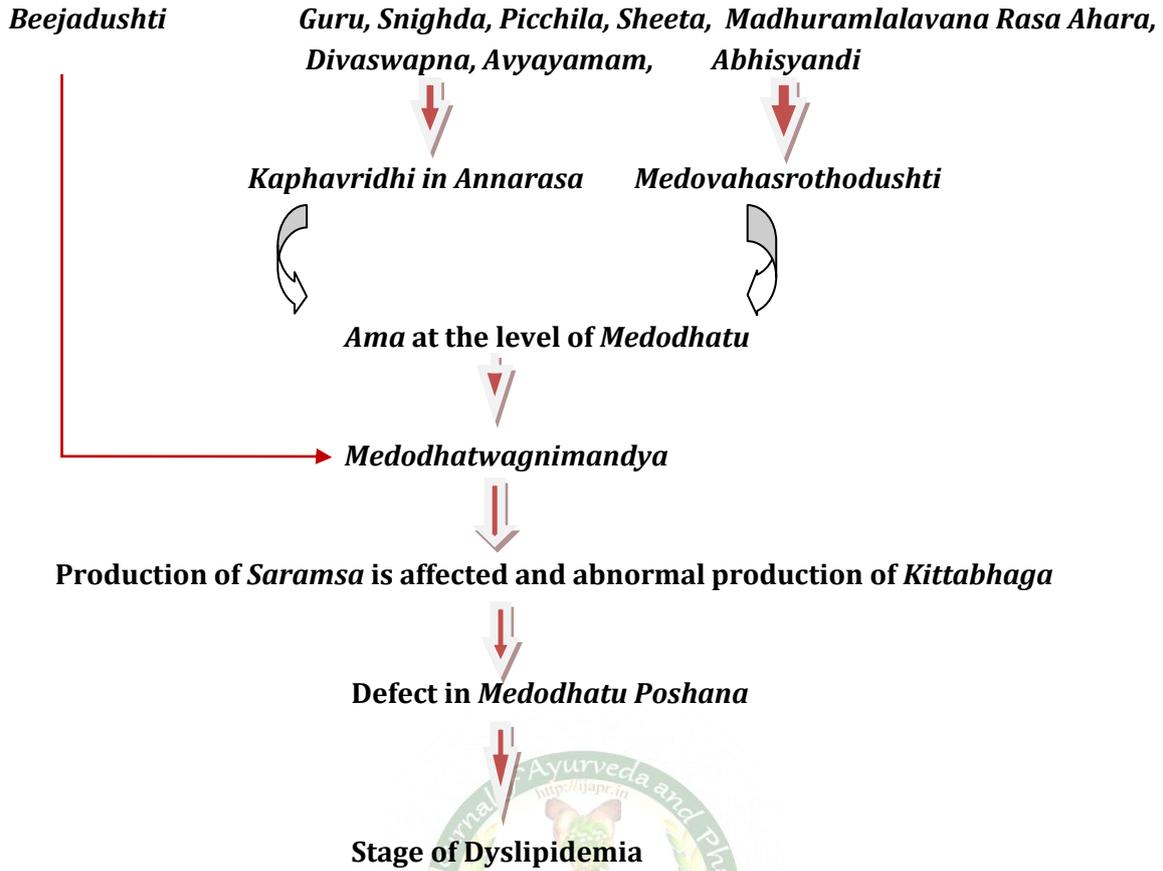
Samprapthi

The specific etiological factors (*Beejadushti*, *Ahara*, *Vihara*) lead to *Kaphavidhi* in *Annarasa*. The same etiology also leads to *Medovahasroto dushti*. Also, *Beejadushti* and affinity of *Kapha* to *Medo dhatu* due to greater similarity (*Atyanta Sadrushatvat*), leads to formation of *Ama* at the level of *Medo dhatu*. This leads to *Medodhatwagni Mandya*. Thus there is defect in *Medodhatu Poshana*. Production of *Saramsa* is affected and there is abnormal production of *Kittabhaga*. This stage can be compared to dyslipidemia. As the process is continued for a long time, it causes *Margavarodha* to the *Srothases*.

Role of Agni in Samprapthi

- In the body, *Tridoshas*, *Dhatu* And *Malas*, their physiological and pathological functions depends on the state of *Agni*. *Agnivikruthi* leads to faulty transformation or improper transformation of body materials.
- The cholesterol and triglycerides formed due to improper metabolism thus can be compared to the *Ama* formed due to *Dhatwagnimandhya*. The *Ama* thus formed combine with the *Dehadhatu*s making them *Samadhatu*s and *Kitta* formation also become impaired.

Samprapthi of Dyslipidemia



Samprapthi Ghatakas

Table 5: Samprapthi Ghatakas

1	Doshas	Vatha- Samana, Vyana Pitha- Pachaka Kapha- Kledaka
2	Dooshyas	Rasa and Medas
3	Agni	Medodhatwagni
4	Ama	Medodhatwagnimandya janitha
5	Srothodushti	Rasavahasrothas and Medovahasrothas
6	Srothodushti prakara	Sanga
7	Uthbhava sthana	Yakrit/ Rasadhathu
8	Sanchara sthana	Rasayani
9	Rogaswabhava	Chirakari

Upadrava

- Wall of Srothas, forming plaques and in turn causes narrowing. This causes Srotorodha gradually and Dhatusamvahanam is deranged.
- Dhamanee Prathichaya or Upalepa which is included under Kaphananatmaja Vyadhis can be considered as Upadrava.^[15]

Chikitsa

- As dyslipidemia is a Santharpanajanya Roga, Apatharpana is the treatment.^[16] It may be attained by Nidanaparivarjana and Samprapthi Vighatana.
- The treatment should aim at the correction of Agni and Pachana of the accumulated Samamedas. Management targets to improve the functional status of Agni at different levels and Lekhana to remove Srotorodha in vessels.

- Focal point in management is care of *Yakrit*, as seat of *Agni*.
- *Agnisatmyakara*, *Kaphamedohara*, *Dhatusatmyakara*, *Vathanulomana*, *Avarnahara* treatments can be done.

Nidana parivarjana or the avoidance of causative factors

- Avoidance of *Kapha-Medo Vardhaka Aharaviharas* is helpful in reducing its incidence, as well as treatment.
- Here the production of *Medodhatugata Ama* is always in relation to the causative factors, on cessation of consumption of causative factor, further production of *Ama* stops immediately, just like melting on ice cubes on withdrawal of its *Nidana*.

Langhana Chikitsa

- Being *Santharpanjanya Roga*, the *Langhana Chikitsa* have the prime role in the treatment.^[17]
- *Langhana* allows, the *Agni* to do *Pachana Karma* according to its strength slowly, by not putting additional load on it, hence leading to self resolution of *Ama*.^[18]

Sodhana chikitsa

- Role of *Shodhana* is in *Kaphachedana*, *Dhatwagnideepana* and *Srotosodana*. As the proper *Sodhana* brings about *Dhatusthiratwa* and *Agnideepthi*, it may be useful in dyslipidemia. *Rookshasodhana* may be done.
- *Lekhana Vasti* and *Virechanam* may be selected, especially if *Sthoulya* also associated.
- **Lekhana Vasti:** *Lekhana Vasti* is mainly *Apatarpana* type of the *Vasti* as all ingredient drugs are generally *Ruksha*, *Tikshna*, and *Srotoshodhaka*.
- **Virechana:** *Virechana* is effective in this condition, since it has got direct impact and control on maintenance of *Agni*. *Pachakapitha* and *Samanavatha* can be controlled by *Virechana*. *Virechana* prevent the production *Dhatugata Ama* in healthy and eliminate the existing *Ama* in *Rogi*.

Samana Chikitsa

- As there is involvement of *Ama*, *Amapachana* and correction of *Agni* should be primary aim of treatment.
- *Pachana*, *Deepana* and *Rookshana* should be done.
- As here *Sanchita Ama* is present, the role of *Pachana* is first and foremost than *Deepana*. The term *Pachana* itself is based on “that which digests *Ama*”.^[19] The latter deals with the initiation and improvement of *Agni* at various levels of the body and thus prevent further *Ama*. *Pachana* here is the curative aspect and *Deepana* is prophylactic aspect. By *Pachana* and *Deepana*, *Ama* may be pacified and

Agnideepthi is obtained which in turn corrects the *Dhatuparinama*.

- Since most of the *Pachanadravyas* possess *Tikshna*, *Ushnagunas*, it easily opsonizes the *Ama* condition by which *Srotovibandhakaritwa* is removed. Here *Ama* is predominant in *Ap* and *Prithvi Mahabhuta* and *Pachana* is of *Agneya*.
- Use of *Katu*, *Thikta Rasa* that become *Katu* on *Vipaka* may be useful. They reduce *Kapha* and *Medas*. *Katu Rasa* is *Deepana*, *Pachana* and *Sneha – Meda-Kleda Soshana*.
- Drugs having *Laghu*, *Rooksha* and *Ushna Veerya* are also useful in this condition. *Lekhaneeya Gana*, *Gomuthra*, *Guggulu* etc are examples. They are *Deepana*, *Pachana*, and due to the *Lekhana* property, it removes the accumulated materials from the *Srothases*.

Table 6: Amahara Rasa Guna Veerya Vipakas

Rasa	<i>Katu, Thikta, Lavana, Ishat Amla</i>
Guna	<i>Laghu, Theekshna, Usna, Vyavayi, Sukshma, Vikasi, Vishada, Ruksha, Katina</i>
Veerya	<i>Ushna</i>
Vipaka	<i>Katu</i>

- **Medohara Chikitsa:** It should also be incorporated; more preferably if the condition is associated with *Sthoulya*.
- **Udwarthana:** It is *Kapha Medohara* and brings about lightness to the body, improves appetite and strengthens the body. It should be done according to the *Bala* of the patients.^[20]

Rasayana Chikitsa

- As *Ama* is *Dhathuleena*, *Rasayana Chikitsa* also may be done.
- *Rasayana* drugs having *Deepana*, *Pachana* and *Lekhana* property may be selected. *Thriphala*, *Silajathu* are some of examples.
- *Rasayana* corrects the structural deformity of the *Dhatu* thereby normalizing the functions, ensure proper *Dhatuparinama* and prevents the instinct for secondary diseases.

Pathyapathya

- *Abhishyandi Ahara* should be avoided. They are atherosclerotic.
- All the *Kaphamedokara Ahara Viharas* are *Apathyas* in this condition. Those which produce *Agnimandya* like *Adhyasana*, *Samasana*, *Vishamasana* and *Virudhahara* should be avoided.
- *Ahara* having *Guru*, *Snigdha*, *Pichila Gunas* should also be avoided.
- Usage of *Thakra*, honey and hot water in the diet should be promoted. *Thakra* is *Agnideepana* and *Srothosudhikara*. *Madhu* is *Kaphachedana*.

- *Pramadhi* diet should be encouraged. It prevents *Srotorodha*.
- Regular *Vyayama* should be practiced. *Vyayama* practiced according to *Bala* provide *Agnideepti*, *Laghutwam* to body, *Karmasamarthata*, *Medakshaya* and *Vibhakta Khana*.^[21] *Chankramanam* provides *Ayus*, *Bala*, *Medha*, *Agni* and *Indriyabodhana*.

DISCUSSION

- ✓ Dyslipidemia is the condition with imbalance of any one or all the lipids in the blood either from organic or nonorganic causes.
- ✓ It is an extremely important condition, principally because of its contribution to atherogenesis and it is an independent and modifiable risk factor for CAD.
- ✓ Quality of care for dyslipidemia is suboptimal in general and variable by cardiovascular disease risk group, ethnicity and gender.
- ✓ In modern medicine, there are effective dyslipidemic drugs like statins which give rapid relief and remain mainstay of lipid modifying therapies, but may cause some long term side effects. So there is a need for a safe alternative treatment which may be effective in reducing lipid level, for prolonged use.
- ✓ In *Ayurveda*, dyslipidemia can be considered as a condition in which *Medas* is pathologically deranged due to *Ama* and *Dhatwagnimamda*.
- ✓ The specific etiological factors include *Beejadushti*, *Ahara*, *Vihara*, *Vikara* and *Manasika*.
- ✓ In the present era, excessive involvement in foods that are too heavy and difficulty to digest, food having *Snigdha*, *Guru*, *Picchila Guna*, *Abhishyandi* and *Virudha Ahara* along with sedentary lifestyle is the basic attributing factor of dyslipidemia.
- ✓ The cholesterol and triglycerides formed due to improper metabolism thus can be compared to the *Ama* formed due to *Dhatwagnimandhya*.
- ✓ As the process continues for a long time, causes *Margavarodha* to the *Srothases* and gradually *Dhatusamvahanam* will be derranged. *Dhamaneprathichaya* or *Upalepa* can be considered as *Upadrava*.
- ✓ As dyslipidemia is a *Santharpanajanyaroga*, *Apatharpana* is the treatment. It may be attained by *Nidanaparivarjana* and *Samprapthi Vighatana*.
- ✓ Lipid profile can be brought back to normal by correcting *Dhatwagni* and ensuring proper *Dhatuparinama*.
- ✓ *Agnisatmyakara*, *Kaphamedohara*, *Dhatu-satmyakara*, *Vathanulomana*, *Avarnahara* treatments can be done.
- ✓ Once the *Agni* is corrected and the *Medas* become *Nirama*, the reversal of pathology occurs. *Sookshma*, *Sthoola* and *Kittabhavas* form properly, which

results in the cure of the disease. The proper digestion leads to proper formation of *Annarasa*, relieves *Srotorodha* and further plaque formation also can be prevented.

CONCLUSION

Even though cholesterol is not mentioned in the *Ayurvedic* tradition, *Ayurvedic* texts discuss about *Medodhatu* and explain how to maintain healthy quantity of fat tissue in the body. Dyslipidemia cannot be correlated to a particular disease mentioned in classical texts, but can be considered as presumable level of stage of *Samprapti*, which may cause disease, but not attained a full status of disease. *Medodhatu* is deranged due to *Ama* and *Dhatwagnimandhya*. Treatment modalities include *Nidanaparivarjana*, *Sodhana*, *Samana*, *Rasayana*, *Pathyapathya* along with Lifestyle modification. Correction of *Agni*, *Pachana* of the accumulated *Samamedas* and *Lekhana* to remove *Srotorodha* are the major components of treatment. Timely intervention in the early stages of *Kriyakala* will prevent progression into further stages like CAD and stroke. Extensive research studies are needed to validate, explore and adopt these *Ayurvedic* concepts and drugs which may be boon to the future world. Patients with dyslipidemia as well as other lifestyle related disorders should get awareness about *Ayurvedic* treatment modalities.

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