ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 6| June 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

INTEGRATIVE MANAGEMENT OF DYSLIPIDEMIA WITH AYURVEDA MEASURES

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ABSTRACT

Blood lipid levels that are abnormally high are referred to as dyslipidemia. It is a metabolic condition that shows up as higher plasma concentrations of total cholesterol, triglycerides, or lower levels of high-density lipoprotein. The primary etiology of cardiovascular disease is atherosclerosis, which in turn is mostly caused by dyslipidemia. According to the Ayurvedic perspective, dyslipidemia is comparable to an aggravated Dusta Meda Dhatu in the body, which is brought on by a hypo-functioning Medo-Dhatwagni and results in Medovaha Srotodusti Vikara. The basic therapeutic principle of Ayurveda is Nidanparivarjana (Avoiding disease causing agents).A Laghu, Ruksha, Kaphamedohara, and Srotoshodhana property diet should be maintained to treat dyslipidemia. While Guru, Snigdha, Kaphamedokara and Abhishyandhi food should be avoided. Using healthy diet rich in complex carbohydrates, vegetables, and fruits seasonedwith adequate quantity of spices with minimum amounts of oils and fats are ideal for management and prevention of dyslipidemia. Article is aimed for explanation of Pathyaand Apathyawith their mode of action in prevention and management ofdyslipidemia.

KEYWORDS: Dyslipidemia, *Medovaha Srotodushti, Nidan Privarjana,Pathya.*

INTRODUCTION

Dyslipidemia is a disorder of disturbed lipid metabolism involving abnormality in any or all of the lipoproteins in blood.Lipids, such as cholesterol or triglycerides, are absorbed from the intestines and are carried throughout the body via lipoproteins for energy, steroid production, or bile acid formation. Major contributors to these pathways are cholesterol, low-density lipoprotein cholesterol (LDL-C), triglycerides, and high-density lipoprotein (HDL)[1]. An imbalance of any of these factors, either from organic or nonorganic causes, can lead to dyslipidemia.

Lipids or fats are building blocks of life and provide energy to cells. Lipids include:

- **LDL cholesterol**, which is considered bad because it can cause plaques to form in the blood vessels.
- **HDL cholesterol**, which is regarded as good because it can help to remove LDL from the blood.
- **Triglycerides**, which develop when calories are not burned right away and are stored in fat cells.

Types and Causative Factors of Dyslipidemia[2]

1. Primary Dyslipidemia- Mostly have genetic relation.
   - Familial combined hyperlipidemia
   - Familial hypertriglyceridemia
   - Homozygous familial or polygenic hypercholesterolemia

2. Secondary Dyslipidemia-Develops due to environmental factors.
   - Obesity
   - Diabetes
   - Hypothyroidism
   - Alcoholism
   - Polycystic ovary syndrome
   - Metabolic syndrome
   - Cushing syndrome
   - Severe infection such as, HIV

PATHOPHYSIOLOGY

Atherosclerosis and dyslipidemia jointly leads to pathogenesis of cardiovascular diseases[3]. Dyslipidemia related cholesterol buildup causes it to be oxidized, which speeds up the description of ICAM-1 and E- selectin for monocyte adhesion and the subsequent sequencing of monocyte inflow and cytokine production. To further encourage the inflow of TG monocytes, the monocytes develop into macrophages and produce monocyte chemoattractant protein (MCP)-1. Additionally, monocytes produce cytokines like interleukin (IL)-6 and speed up the oxidation of cholesterol by releasing oxidizing agents.

Macrophages take up oxidized cholesterol and transform into foam cells, which are then deposited on the blood vessel walls.

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This method triggers the development of plaque and results in atherosclerosis. In this way, dyslipidemia increases the probability of developing atherosclerosis and cardiovascular disease. According to theory, atherosclerotic lesions form when plasma LDL is transported and retained beyond the endothelial cell layer and into the extracellular matrix of the subendothelial region.

LDL undergoes chemical revision in the arterial wall via oxidation and nonenzymatic glycation; moderately oxidized LDL then draws monocytes to the artery wall.The subsequent conversion of these monocytes into macrophages raise LDL oxidation. An atherosclerotic plaque eventually develops a fibrous covering to protect the inner core of lipids, collagen, calcium and inflammatory cells like T lymphocytes after repeated injury and repair to prevent plaque rupture and ensuing coronary thrombosis, the fibrous plaque must be maintained.

As the elevated formation of reactive oxygen species (ROS) is intimately associated to endothelial dysfunction and the activation of the vascular inflammatory response, oxidative stress constitutes one of the fundamental pathogenetic processes of atherosclerosis. The rapid production of ROS is linked to common conditions that are also recognized as cardiovascularrisk factors that predispose to atherosclerosis, such as hypercholesterolemia, hypertension, diabetes, and smoking are associated with accelerated generation of ROS.

Atherosclerosis is also recognized as an inflammatory disorder of the medium and large arteries. Repeated injury and repair within an atherosclerotic plaque eventually result in a fibrous cap protecting the underlying core of lipids, collagen, calcium and inflammatory cells such as T lymphocytes. Maintenance of the fibrous plaque is essential to prevent plaque rupture and ensuing coronary thrombosis. Oxidative stress represents one of the fundamental pathogenetic processes of atherosclerosis.

DIAGNOSTIC PROCEDURE

Screening can take place postprandially or during a fast (the latter having a higher TG), but if altered, two fasting samples taken at least two to three weeks apart must be used for verification, for both diagnostic and therapeutic purposes, the mean value between these two numbers is being used[4]. By deducting HDL from the Total Cholesterolin the postprandial sample, non- HDL cholesterol is determined[5]. The first three weeks after an infection should not be used for lipid profile screening due to the possibility of inflammation, secondary to severe infections, which can significantly accelerate TG[6]. It is recommended to take a fasting lipoprotein profile measurement, that includes total cholesterol, LDL, HDL, and triglycerides, for which classification is mentioned in [Table 1] with normal range.

Table 1: Classification of total LDL, HDL, Cholesterol and triglycerides

Total Cholesterol	
<200mg/dl	Desirable
200-239mg/dl	Borderline high
>/240mg/dl	High
LDL Cholesterol	
<100mg/dl	Optimal
100-129mg/dl	Near or above optimal
130-159mg/dl	Borderline high
160-189mg/dl	High
>/190mg/dl	Very high
HDL Cholesterol	
<40mg/dl	Low
>/60mg/dl	High
Triglycerides	
<150mg/dl	Low
150-199mg/dl	Borderline high
200-299mg/dl	High
300-500mg/dl	Very high

PATHOPHYSIOLOGY OF DYSLIPIDEMIA IN *AYURVEDA(SAMPRAPTI)*

Elemental aspects of pathophysiology of dyslipidemia as per *Ayurveda(Sampraptighatak)*is being mentioned in [Table 2

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***Table 2 : Samprapti Gathaka of* Dyslipidemia**

Element	*Status of Abnormality*
Dosha	*Kapha and Pitta*
Dushya	*Rakta* or *Rasa*
Srotas	*Raktavaha and Rasavaha*
Srotodushti	*Atipravritti*and *Sanga*
Udhbhavasthana	*Amasaya*
Sancharasthana	*Rasa- Raktavaha Srotas*
Vyaktasthana	*Dhamani*
Rogamarga	*Abhyantara*
Agni	*Jatharagni or BhutagniMandyta*

According to *Ayurveda* a person following *Apathya* like *Avyayama* (lack of exercise) , *Achinta* (stress-free life *),* *Diwaswapna* (day sleeping*) Atisnigdha* (excessive oily food intake), *Madhura* (sweet food), *Adhyashan* (frequent eating), *Atimatra Ahara* (over eating) in diet and *Beeja Swabhavaj* (hereditary or genetic trends) leads to *Medovaha Srotodushti*. In due course of time blockage of *Medovaha Srotasa* propagates defective tissue metabolism which leads to *Medoroga* and its associated disorders like *Sthaulya, Premeha, Kustha*, disorders of *Ama, Napunsakata*, dysuria. The *Ayurvedic* methods of lifestyle modification and *Aptarpana Ahara* prevent Dyslipidemia and provide better management over modern methods of management which leads to adverse effect of drug intake for long time period, drug dependency also causes a financial burden over society[7] in comparison to Ayurveda, and Ayurveda provide cost effective, least adverse effects. Ayurveda also had a holistic approach to treat any disorder which cures the deformity by strengthening the natural life process of the body thus also corrects Srotodushti with time[8].

Specific Protocols for the management of Dyslipidemia

PATHYA* AND *APATHYA AHARA

The uniqueness of *Ayurveda* is the concept of *Pathya* and *Apathya*. The distinction between *Pathya* and *Apathya* is that the former refers to substances or lifestyle choices that do not negatively impact the body and mind, while the later is applied to those that do[9]. The *Pathya Apathya* that is stated in the *Ayurvedic* texts for *Prameha* and *Medoroga* might also be employed here as dyslipidemia is an entity that is type of *Medo Dushti*.The way that *Pathya* is categorized here is based on its effectiveness as a treatment for dyslipidemia (*Medo Roga*) at different levels of *Samprapti Ghatak. Pathya- Apathya* is classified below on basis of *Ahar (*Dietarychanges*) [Table 3], Ahara Vidhi* (DietaryProtocol) [Table 4] and *Vihara*(lifestyle modification) [Table 5].

Table 3 :*Pathya & Apathyaahara*

Pathya Ahara	***Apathya Ahara***
Rakta Shali (Oryza Sativa), Takra(buttermilk*)*	*Aavi Dugdh (milk* of Sheep)
Patola(Trichosanthes dioica) , kushmand (Zingiber officinale) ,Shunthi (dried Zingiber officinale) , Vilepi(porridge made of rice *)*	*Madhuka (Madhuca longifolia)*
Kadliphala (Musa paradisiaca) , Dadima (Punica granatum) , Draksha (Vitis vinifera) , Haritki (Terminalia chebula)	*Virrudha Anna* (Intake of food opposite in nature/properties)
Yavani (Trachyspermumammi),Lasuna (Allium sativum) , Purana Madhu (old honey) *, Ardraka (Zingiber officinale)*	*GuruPaki Ahara* (food article which are heavier to digest)
Purana Guda (old Jaggary *) ,Saindhavlavan (rock salt) ,Mulaka (Raphanus sativus)*	*Purana PatraShaka* (non -fresh leafy vegtables)
Mudgayusha (Phaseolus mungo porridge) , Kullathayushsa (Ayurveda recipe made withMacrotyloma uniflorum*)*	*Naveen Anna (* newly precured millets) , *Ksheer-Ikshu Vikrati* (milk products and sugarcane derived products *)*
Kodo, Katu Tikta Kashaya Dravya, Sarshap Taila, Ela Patra Shaka, Ushan Jala, consumption of water before food	*Madhura Dravya,* consumption of water after food, *Matsya* (fish) , *Mansa* (flesh)

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Table 4: *Ahara Vidhi* (Dietary Protocols)

Meal/Time	Menu	Quanitity	Instructions
Early morning	Double toned milk/coconut water. Fruits– banana/pomegranate/pear/apple/ musk melon/guava/watermelon	1 glass/ 1cup 1nos	Prepare fresh. No canned, packed juices. Do not add sugar. Sprinkle citrus fruit with *Lavanbhaskar churna*.
Breakfast	Roasted oats upma with vegetables, poha. Fermented foods- idly, dosa,upma etc. Sprouts, soyabean , kala chana Boiled egg/ omelet- 2 eggs	1 bowel 1 serving Half bowel	Used olive oil/mustard oil/ sesame oil No sauce, pickle Millets>cereals(bajara, ragietc)
Lunch	Chapati Vegetable- methi/ bhindi/ brinjial /lauki,lashun/palak/capsicum Salad- chakundar, cucmber, tomato, lemon Dal- mudga(green gram)/ kulatha(horse gram) Brown rice Butter milk	2-3 nos 1 bowel 1 plate 1 bowel 1 plate 1 glass	avoid heavy pulses (urad, masha) sprinkle cinnamon or kalimaricha on salad. Add jeera powder and saindhavlavan in butter milk according to need
Evening	Green tea Lemon tea with honey Soup- corn / vegetable/ tomato etc (avoid spices)	1 cup 1 cup 1 bowel	No biscuits, cookies, candy, pancakes etc.
Dinner	Chapatti Dal – green gram (light) Vegetable-(light) methi/ bhindi/ brinjial /lauki,lashun/palak/capsicum	1-2 nos 1 bowel ½ bowel	No curd, milk at night Dal and vegetables to be prepared in less oil and spices.

Table 5: *Vihara* (Lifestyle modification)

Smoking cessation	• Results in 36% reduction in the relative risk of mortality from coronary artery diseases[10].
Diet	• **1** saturated and trans fats • 1 simple sugars and refined carbohydrates • Fruits and vegetables • Whole grain cereals • Proportion of mono and polyunsaturated oils, including omega- 3 fatty acids
Optimal waist circumference[11]	• < 94 cm (37 inches) for men • <80cm (32 inches) for women • Differs by ethnicity with lower cut- offs appropriate for south and east Asians
Optimal BMI	• <25kg/m^2

Language formation for below points in paragraph with reference

Do's

1. Include foods high in HDL such as almonds, walnuts, oats, flax seeds.
2. Include fatty fish such as tuna, sardine, salmon, mackerel.
3. Consume egg white and skin out chicken.
4. Whole grains, legumes, vegetables and fruits is beneficial as they are rich in fibre.
5. Include low fat milk products.
6. Include 1 cup of green tea and physical activity in Daily routine.
7. Include foods high in soluble fibre such as banana, oats, apple, guava, barley, quinoa, flax and chia seeds, figs, coconut, okra.
8. *Swedan, vaman, virechan, lekhan basti, langhan*
9. *Pranayam*, meditation, *Agarulepa*

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Don'ts

1. Avoid red meat, organ meat, and shell fish as they rich in cholesterol.
2. Avoid consumption of foods made by reheated oil.
3. Heavy oils foods, foods high in cream and cheese.
4. Avoid saturated fat such as palm oil, butter, ghee.
5. *Trishana, mala mutradivegadharan*
6. *Rakta mokshana, diwaswapana*

DISCUSSION

A metabolic condition linked to improper fat metabolism is dyslipidemia. It is a risk factor for atherosclerosis, stroke, and cardiovascular disease (CVDs). However, it can be avoided by adopting a healthy lifestyle and diet. The American Association of Clinical Endocrinologists advises screening for the early diagnosis of excessive blood lipid levels to prevent heart problems.

According to *Ayurveda* it can be correlated with *Dushta Meda Dhatu*. So, the *Pathya* useful in dyslipidemia might have the properties such as Deepan, *Pachan*, *Ushna Virya*, *Ruksha*, *Tikshana*, *Srotoshodhana*, *Hridya*, *Lekhan*, *Kaphaghna* and having *Medo Nashak* property.

Each *Ahara Dravya* has specific pharmacological actions, such as acting on *Agni Deepan Pachana*, *Srotoshodhana* property, and some directly acting on *Medo Dhatu.* This study provides lipid lowering *Pathya Aahara Vihar* in prevention and management of dyslipidemia based on *Ayurveda* and research evidences.

CONCLUSION

A successful and comprehensive approach to treating dyslipidemia is integrative management of the situation, which combines Ayurvedic treatments and specialty medications Ayurveda is common with herbs, dietary recommendations and lifestyle practices and can be used with modern medical approaches Dyslipidemia -Effectiveness of Ayurvedic treatments in management is supported by scientific research, which also confirms the ability of these interventions to improve lipid metabolism, improve heart health, and reduce complications so but more clinical research is needed to validate the use of these results to optimize treatment for patients and validate health improvements as long as research continues to bridge the gap between treatment the brink between traditional and modern medicine

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