

# A Review Article on Hyperlipidemia

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## Abstract

Hyperlipidemia is a medical condition that causes an increase in one or more plasma lipid levels including, triglycerides, cholesterol and phospholipids. The increase in plasma levels can cause various diseases of the cardiovascular system. Cardiovascular diseases include atherosclerosis, Ischemic heart disease, Cardiac arrhythmias and Heart blockage. Heart blockage due to plaque formation can be treated with various drugs. This article contains an Introduction, type of lipoprotein, classification of Hyperlipidemia, causes, symptoms, pathophysiology, diagnosis, prevention and treatment.

**Keywords:** Hyperlipidemia • Cardiovascular diseases • LDL • VLDL • Chylomicrons

## Introduction

Hyperlipidemia is the condition in which the elevation of plasma lipids occurs, which can cause various diseases including coronary, cerebrovascular and peripheral vascular artery diseases. Hyperlipidemia is defined as the condition in which the level of cholesterol and triglycerides increases in the plasma than normal. In the body, the liver produces about 80% of cholesterol but the rest is obtained from the food we eat such as fish, eggs and meat. Hyperlipidemia is the major cause of various Cardiovascular diseases which shows greater risk factors and causes major issues [1,2].

Various drugs are used to treat Hyperlipidemia and to reduce cholesterol levels in the plasma which includes statins and fibrates.

### Types of lipoproteins

- High-Density Lipoproteins (HDL)
- Intermediate-Density Lipoproteins (IDL)
- Low-Density Lipoproteins (LDL)
- Very Low-Density Lipoproteins (VLDL)
- Chylomicrons

**High-Density Lipoproteins (HDL):** It is considered a good cholesterol and is synthesized in the liver. It picks up the excess amount of cholesterol from the blood and takes it back to the liver where breakdown happens and removal from the body. An HDL level ranging from 60 mg/dL should be considered desirable and protect against heart diseases [3].

**Intermediate Density Lipoprotein (IDL):** After the removal of Triglycerides from VLDL by muscles and Adipose tissues, the IDL particles form which have cholesterol molecules.

**Low-Density Lipoprotein (LDL):** It is sometimes referred to as bad cholesterol because it makes up most of your body's cholesterol. High levels of LDL cholesterol can cause the risk of Heart disease and strokes.

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**Very Low-Density lipoprotein (VLDL):** Very low-density lipoprotein is produced in the liver and released in the bloodstream for supplying fats(triglycerides) to the body tissues.

**Chylomicrons:** They are the large triglycerides-rich lipoprotein produced in tight junctions of the cells. They transport dietary triglycerides and cholesterol peripherally [4,5].

### Types of hyperlipidemia

Various types of Hyperlipidemia include:

**Based on lipid types:** Two types

**Hypercholesterolemia:** It is a medical condition in which is high amount of LDL is found in blood and this can cause various heart diseases.

**Hyperlipidemia:** It is a condition in which there is a high amount of lipid found in blood and it deposits in blood vessels and restricts the blood flow [6].

### Based on causing factors:

#### 1. Primary hyperlipidemia (Familial: Hereditary)

It can be caused due to some genetic defects. It can be both monogenic and polygenic. It has various types that cause high-risk factors (Table 1).

#### 2. Secondary hyperlipidemia (acquired)

It can cause pancreatitis. It is caused by various disorders like diabetes, glomerular syndrome, hypothyroidism and chronic alcohol intake [7].

### Complications of hyperlipidemia

There are various complications which include:

- Atherosclerosis
- CAD
- Ischemic Heart Diseases
- Myocardial infarction
- Retinopathy
- Nephropathy

**Table 1.** Primary hyperlipidemia various types that cause high-risk factors.

Class	Increased Lipoproteins
Type I	Increased LDL levels
Type IIa	Increased LDL levels
Type IIb	Increased LDL and VLDL levels
Type III	Increased IDL levels
Type IV	Increased VLDL levels
Type V	Increased VLDL and chylomicron levels

**Atherosclerosis:** Hyperlipidemia can cause various cardiovascular diseases. Atherosclerosis is one of the diseases that can be caused by hyperlipidemia. It is the process in which there is accumulation of lipids, cholesterol and calcium occurs which causes plaque formation on the walls of arteries.

**Coronary Artery Diseases (CAD):** It occurs when there is an accumulation of lipids on the walls of arteries and plaques are formed which cause the narrowing of arteries and there is less blood supply and insufficient oxygen supply occurs in the body.

**Ischemic Heart Disease (IHD):** Ischemia is defined as inadequate blood supply to the body organ due to plaques that block the blood vessels. Ischemic heart disease is also called Coronary Heart disease (CHD). Due to less blood supply stroke can occur.

**Myocardial Infraction (MI):** MI is a medical condition where the heart muscle begins to die due to less blood supply to the heart. It can be a life-threatening emergency [8,9].

### Other complications include

- Peripheral artery disease
- Microvascular disease
- Sudden cardiac arrest
- Carotid artery disease

### Causes of hyperlipidemia

- Dairy Products
  - Obesity
  - High Fat Intake
  - Alcohol
  - Smoking
  - Genetic or Inheritance
- Several drugs include corticosteroids, estrogens and beta blockers.

### Symptoms of hyperlipidemia:

- Chest Pain
- High rate of Obesity
- Increased Glucose levels
- High Cholesterol levels
- Blood vessels blockage
- Pancreas, liver and spleen swelling

### Pathophysiology of hyperlipidemia:

Hyperlipidemia is generally elevated LDL levels. Its elevation can cause an increased concentration of lipids and fats in the blood. It can cause endothelial damage and plaque formation on the artery walls. These formed plaques can cause the narrowing of arteries and less blood supply [10-14].

### Diagnosis:

Diagnosis of Hyperlipidemia occurs through blood tests, by checking blood cholesterol levels. Hyperlipidemia can be diagnosed by regular checkups of LDL, HDL, VLDL and triglyceride levels in the blood.

### Prevention and treatment of hyperlipidemia

#### Prevention:

- Maintain weight and cholesterol intake.
- Ensure proper diet and Physical exercises.

- Ensure to take food with high soluble fiber such as oats, beans and fruits.

### Lifestyle modifications to prefer for lowering the cholesterol level

- Proper diet
- Eating healthy meals
- Having non oily foods
- Eat plenty of fruits
- Regular exercise and yoga

### Treatment:

- Lifestyle Changes
- Ayurvedic changes
- Using Home Medications such as turmeric, coconut oil, fish oil, Indian gooseberry, soybean
- Using Medicinal Plants to lower Hyperlipidemia

### Pharmacological treatment

There are various drugs present on the market that reduce Hyperlipidemia which include statins, Fibrates, Niacin and plant sterols.

**Fibrates:** Fibrates include clofibrate, fenofibrate shows lipid-lowering activities, reduces LDL levels and thus HDL levels increase moderately. It shows a slower reduction in coronary atherosclerosis.

**Statins (HMG- CoA reductase Inhibitors):** Statins include atorvastatin, Fluvastatin, Lovastatin, Pravastatin lowers the cholesterol levels of the body. Statins lower the LDL levels by inhibiting the HMG-CoA reductase enzyme activity which leads to results in a decrease in Hepatic cholesterol content.

**Niacin (Nicotinic acid derivatives):** It works by lowering both cholesterol and triglyceride concentrations in plasma. It also increases High-Density Lipoprotein (HDL) lipoprotein.

**Side effects of antihyperlipidemic:** Nausea and vomiting, joint pain, severe headache, vision problems, Swelling of arms and legs, black stool, bleeding, muscle pain [15-18].

### Recent invention drugs for hyperlipidemia

In a few years there have been many cases of Hyperlipidemia noticed which leads to various cardiovascular diseases, recent advancement shows the new drug discovery for lipid lowering and preventing cardiovascular diseases. Drugs such as Bempedoic acid, Inclisiran, Evinacumab and Pemafibrate work well in lowering the lipid level and inhibiting cholesterol synthesis [19].

## Conclusion

From the above study, the hyperlipidemia condition shows a greater risk factor for cardiovascular diseases. Hyperlipidemia can be treated by recent drugs, proper diet regular exercise and yoga. Diet maintenance can help to reduce early Hyperlipidemia conditions.

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## Conflict of Interest

None.

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