A Review on Dyslipidemia: Types, Risk Factors and Management

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A B S T R A C T

Dyslipidemia is characterized by abnormally elevated cholesterol or fats (lipids) in the blood. Cardiovascular disease (CVD) is becoming more prevalent worldwide and is one of the leading causes of death. Dyslipidemia is an important risk factor for cardiovascular disease other factors are hypertension, diabetes mellitus, and smoking. Presently statins and fibrates are the major anti-hyperlipidemic agents for the treatment of elevated plasma cholesterol and triglycerides respectively, with remarkable side effects on the muscles and the liver. Lifestyle interventions remain a key component for the management of dyslipidemias. The present review will highlights types, risk factors and management available for dyslipidemia.

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INTRODUCTION:

Dyslipidemia defined as dysregulated plasma lipids, including abnormally elevated plasma triglycerides, total cholesterol and LDL-cholesterol reducing HDL-cholesterol. Dyslipidemia is a lipoprotein metabolism disorder that shows increasing cholesterol level, triglyceride level. Dyslipidemia is potential risk factors for further developing cardiovascular disease. Some anti-dyslipidemia drugs currently available in the market include statins, fibrates, niacin, ezetimibe, and bile acid binding resins.

Classification & Etiology of Dyslipidemia

Dyslipidemia is classified as primary (genetic & most common in children) or secondary dyslipidemia (due to lifestyle & common in adults). The causes behind primary dyslipidemia are single or multiple gene mutations that result in overproduction or defective clearance of TG & LDL cholesterol, & underproduction or excessive clearance of HDL. The most important causes of secondary dyslipidemia are alcohol overuse, a sedentary lifestyle with excessive dietary intake of saturated fat, cholesterol, & trans-fats. Some medical conditions found to be associated with secondary dyslipidemia such as diabetes mellitus, chronic kidney disease, primary biliary cirrhosis and other cholestatic liver diseases.

Symptoms

Dyslipidemia usually show symptoms like confusion & dyspnea, impairment of balance tendinous xanthomas (elbow, knee tendons), aphasia difficulty in speaking, sensation of tickling, tingling, burning, pricking but can lead to symptomatic vascular diseases, including coronary artery disease and peripheral arterial disease. High levels of TGs (> 1000 mg/dL) can cause acute pancreatitis. Severe hyper-triglyceridemia (> 2000 mg/dL) can give retinal arteries & veins a milky white appearance (lipemia retinalis). Extremely high lipid levels also can give a lactescent (milky) appearance to blood plasma.

Physiological Consequences of Dyslipidemia

Cardiovascular Disease:

Continue high lipid intake results abnormal lipid profile in blood & it can lead to lipid deposition in blood vessels thus generate much type of consequences in body. It may be coronary artery disease mean fat deposition in coronary artery thus weakened blood supply & nutrient to heart. Fat deposition on artery, can cause bulge & weakness on artery wall can lead to rupture it & form catastrophic condition called aneurysm. Other serious situations are stroke, gangrene, & atherosclerosis.
Other Disorders:
Lipid-disorders directly as well as indirectly promote many diseases such as type 2 diabetes mellitus, and a number of common cancers, PCOS in females\(^9\) mental illness like bipolar disorder, schizophrenia\(^{10}\), stress & physical inactivity\(^{11}\). Dyslipidemia also promotes prostatic growth & contractility that represent important risk factors for the development of benign prostatic hyperplasia\(^{12}\).

Dyslipidemia and Obesity:
In every country incidences of obesity is continuously growing, & often dyslipidemia occurs in parallel. Globally, around 2.8 million people die in each year as a result of being overweight or obese.\(^ {13}\). If the current trend continues, 86.3% of adults will be overweight by 2030 & number of deaths will be so high\(^ {14}\).

Dyslipidemia: Mechanisms
Numerous pathways, enzymes, proteins & factors are involved in the process of Lipid metabolism thus it is very complex mechanism & only one abnormality can lead to dyslipidemia, but three main pathways are responsible for the uptake, transport & storage of lipids in to the body, included the exogenous pathway, the endogenous pathway, & reverse cholesterol transport pathways.\(^ {15}\)

Management:
The first line treatment of abnormal cholesterol in dyslipidemia is usually to take low saturated & trans fats containing diet, & high intake of fruits & green vegetables, nuts, seeds, stop smoking, drinking & increase exercise in daily routine. Liver makes all type of cholesterol as per body need. Cholesterol also comes in body from dietary sources such as animal-based foods like milk, eggs, & meat. Lipid or cholesterol lowering drugs included 3- hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitors commonly termed “statins”, Fibric acid derivatives, niacin/nicotinic acid, bile acid sequestrates cholesterol absorption inhibitors.\(^ {16}\)

HMG-CoA Reductase Inhibitor (Statins):
Statins inhibit HMG-CoA reductase thereby, suppress cholesterol biosynthesis. Currently available statins are lovastatin, simvastatin, pravastatin, atorvastatin and rosuvastatin etc.\(^ {17}\) HMG-CoA reductase is the key enzyme of cholesterol biosynthetic pathway & catalyzes the change of HMG-CoA to mevalonate, as a rate-limiting stop in cholesterol biosynthesis.\(^ {18}\)

Fibrates:
Clofibrate was the first fibrate drug: it is developed in Japan 1960s. Peroxisome proliferators activated receptor (PPAR) activation is one of the hallmarks of fibrate drugs action.\(^ {19}\)

Niacin/Nicotinic acid:
Niacin or vitamin B3 is available as a prescription medication for lipid lowering & as an over-the-counter for supplement. The lipid-lowering effects of niacin were first noted in 1955; niacin reduced total cholesterol, LDL-C & increased HDL-C by different mechanisms.\(^ {20}\)

Bile-acid binding resins:
The bile acid resins are the safest & oldest agents of all lipid lowering drugs. Three bile acid resins are mainly available cholestyramine, colestevam and colestipol.\(^ {21}\)

Cholesterol Absorption Inhibitors:
Cholesterol absorption inhibitors decrease the absorption of dietary & biliary cholesterol into the intestine. Therefore reduced amount of intestinal cholesterol reached to the liver results in increased activity of hepatic LDL receptor, which leads to elevated clearance of LDL cholesterol.\(^ {22}\)

Lipid-Regulating Agent:
Omega-3 acid ethyl ester comes in class of medications called lipid-regulating agents and can be used it together with life style changes to treat hypertriglyceridemia.\(^ {23}\)

CONCLUSION:
Dyslipidemia refers to unhealthy levels of one or more kinds of lipid in blood. Several factors can lead to dyslipidemia such as smoking, obesity, sedentary lifestyle and consumption high fatty food.. Lifestyle changes may help to get cholesterol and triglyceride levels under control. Daily exercise and weight loss may also improve cholesterol profile. Statins or fibrates and a healthy lifestyle, usually manage dyslipidemia.

REFERENCES: