

A Mini-Review on Hyperlipidemia: Common Clinical Problem

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Abstract

Cholesterol is a waxy substance made by the body and also comes from the diet. High cholesterol in body is also commonly known as hyperlipidemia. It is a common problem which may deposit extra fats in the blood. Hyperlipidemia is the leading risk factor for cardiovascular diseases. Cholesterol and triglycerides together make it difficult for blood to pass by narrowing the blood vessels. This review basically focuses on the causes, types, diagnosis, symptoms and treatment of hyperlipidemia. It may be treated by changing life style, eating healthy food, doing exercise but several medications are also available in the market.

Keywords: Hypercholesterolemia; Atherosclerosis; Triglycerides

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Introduction

Human body needs cholesterol which is involved in building the membrane of the cells and hormones like estrogen [1]. Liver is responsible for controlling the content of cholesterol in the blood stream. In the body, liver produces approximately 80% of the cholesterol whereas rest of the cholesterol is obtained from the food like fish, eggs, meat, etc. [2]. After having a meal, cholesterol is digested and absorbed in small intestine then the metabolism and storage occurred in the liver. The cholesterol may be secreted by the liver whenever the requirement of cholesterol is needed by the body [3]. Cholesterol is not present in the food which is derived from the plants [4].

Cholesterol and several other fats together deposit inside the arteries making them narrower by which blood cannot pass easily through it and the pressure may be elevated causing high blood pressure [5]. The deposition of cholesterol may lead to blood clotting and if it breakdown and goes through the blood towards the heart then it may leads to heart attack and if it enters the brain then it may increase the chances of stroke [6]. The main etiology of elevated cholesterol in blood is high intake of several saturated fats [7]. Cholesterol are attached or carried by lipoproteins (lipo=fat) as it cannot travel freely in the blood [8].

Literature Review

Lipoproteins are basically categorized into three types [9]:

- LDL (Low Density Lipoprotein)
- HDL (High Density Lipoprotein)
- VLDL (Very Low Density Lipoprotein)

Low Density Lipoproteins (LDL) is thought to be as the 'bad' cholesterol due to higher ratio of cholesterol content to protein and this elevated level may increase the risk of causing heart disease, stroke, etc. [10]. Sometime plaque buildup or deposits along the walls of arteries due to which artery become narrow and the flow of blood decreased in the body [11]. Blood flow may obstruct by plaque rupture as it may cause a clotting of blood which may lead to heart attack or myocardial infarction [12].

High Density Lipoprotein (HDL) may be protective against heart disease, stroke, etc. and thus thought to be "good" cholesterol [13]. The lower level of cholesterol and higher level of protein may leads to HDL. Very Low Density Lipoproteins (VLDL) are associated with plaque deposits and contain even less protein than LDL [14]. Triglycerides are basically those types of fat which involves the low level of HDL and high level of LDL with the elevated level of cholesterol [15]. The blood test determines the total cholesterol score by the sum of HDL, LDL and triglycerides [16]. A high score indicates higher risk of various heart diseases [17,18] (**Table 1**).

Types of Hyperlipidemia

The main types of hyperlipidemia having different effects on the body are the following [19]:

- **Type I:** Children are mostly by this type of hyperlipidemia [20]. It may cause infections in pancreas, enlargement of liver and also cause abdominal pain. This is hereditary and also known as LPL deficiency which may destruct the breakdown of fats [21].
- **Type II:** This is the high level of LDL which may deposits fat around the eyes [22,23].

Table 1 Effects of the level of cholesterol [18].

Total level of cholesterol	Category
Less than 190 mg/dl	Desirable
200-240 mg/dl	Borderline
Above 240 mg/dl	High
LDL (Bad) level of cholesterol	LDL category
Less than 98 mg/dl	Optimal
98-130 mg/dl	Above optimal
131-159 mg/dl	Borderline
160-190 mg/dl	High
Above 190 mg/dl	Very high
HDL (Good) level of cholesterol	HDL category
Less than 39 mg/dl	Major risk for heart
39-59 mg/dl	Better
Above 60 mg/dl	Protective against heart disease

- **Type III:** This basically affects the level of lipoproteins [24]. The level of LDL is low and HDL is normal [25]. It may cause yellowish grey plaques around the eyes. It increases the early onset of cardiovascular disease [26].
- **Type IV:** The cholesterol level decreased whereas the level of triglycerides elevated which may leads to obesity [27].

These all types of hyperlipidemia may be controlled by diet [28].

Causes

Cholesterol, saturated fat, trans fat in the following food may raise the lipid level in blood:

- Dairy products.
- Ice cream pastries.
- Fried and junk foods.
- Meat etc. [29].

Several other causes of hyperlipidemia

- Obesity.
- Genetic or inheritance.
- Smoking.

References

- 1 The Scandinavian Simvastatin Survival Study (4S) (1994) Randomised trial of cholesterol lowering in 4444 patients with coronary heart disease. *Lancet* 19: 1383-1389.
- 2 De Lorgeril M (2014) Cholesterol and statins. Sham science and bad medicine. Thierry Souccar Publishing, Vergèze, France.
- 3 Miller CL, Assimes TL, Montgomery SB, Quertermous T (2014) Dissecting the causal genetic mechanisms of coronary heart disease. *Curr Atheroscler Rep* 16: 1-406.
- 4 Genest J, McPherson R, Frohlich J, Anderson T, Campbell N, et al. (2009) Canadian cardiovascular society/Canadian guidelines for the diagnosis and treatment of dyslipidemia and prevention of cardiovascular disease in the adult-2009 recommendations. *Can J Cardiol* 25: 567-579.
- 5 Anderson TJ, Gregoire J, Hegel RS, Stone JA, Ur E, et al. (2013) 2012 Update of the Canadian cardiovascular society guidelines for

- Several drugs such as corticosteroids, estrogen, beta-blockers may cause hypertriglyceridemia.
- Alcohol, steroids, hypothyroidism, kidney failure etc.
- Doing excess of exercise daily [30].

Symptoms

- If hyperlipidemia leads to atherosclerosis then chest pain (angina), heart attack or stroke may occur in body [31].
- When the level of cholesterol increases it may also get deposited under the eyes [32].
- Nodules are formed on the knees if the level of triglyceride increases [33].
- Liver and pancreas may get swollen.
- Vessels of brain and heart may be blocked [34].

Diagnosis

Hyperlipidemia may be diagnosed by a regular checkup of LDL, HDL, VLDL and Triglycerides in blood test [35].

Treatment

The following changes in lifestyle may lower the cholesterol level:

- Proper diet.
- Less weight of the body.
- Regular exercise.
- Having non-oily food.
- Eat pears, apples, bananas etc.
- Have fish twice a week.
- Fibrates (fenofibrate), statins may lower the triglyceride levels [36].
- Maximum time the lifelong treatment and medications are required [37].

Conclusion

Hypercholesterolemia or hyperlipidemia should be cured as its elevated level may leads to several harmful diseases like atherosclerosis, cardiovascular, high blood pressure and many other severe problems which seriously affect the human body.

the diagnosis and treatment of dyslipidemia for the prevention of cardiovascular disease in the adult. *Can J Cardiol* 29: 151-167.

- 6 Reynolds risk score.
- 7 McCormack JP, Allan GM (2010) Measuring hsCRP-an important part of a comprehensive risk profile or a clinically redundant practice?. *PLoS Med* 7: e1000196.
- 8 Jackevicius CA, Mamdani M, Tu JV (2002) Adherence with statin therapy in elderly patients with and without acute coronary syndromes. *JAMA* 288: 462-467.
- 9 Zhang H, Plutzky J, Skentzos S, Morrison F, Mar P, et al. (2013) Discontinuation of statins in routine care settings: A cohort study. *Ann Intern Med* 158: 526-534.
- 10 About the Statin USAGE Survey. Available from: <http://www.statinusage.com/Pages/about-the-survey.aspx>
- 11 Sugiyama T, Tsugawa Y, Tseng CH, Kobayashi Y, Shapiro MF (2014) Different time trends of caloric and fat intake between statin users

- and nonusers among US adults: gluttony in the time of statins?. *JAMA Intern Med* 174: 1038-1045.
- 12 Ference BA, Yoo W, Alesh I, Mahajan N, Mirowska KK, et al. (2012) Effect of long-term exposure to lower low-density lipoprotein cholesterol beginning early in life on the risk of coronary heart disease: A Mendelian randomization analysis. *J Am Coll Cardiol* 60: 2631-2639.
 - 13 Brown MS, Goldstein JL (1996) Heart attacks: Gone with the century?. *Science* 272: 1-629.
 - 14 Chiuvè SE, Fung TT, Rexrode KM, Spiegelman D, Manson JE, et al. (2011) Adherence to a low-risk, healthy lifestyle and risk of sudden cardiac death among women. *JAMA* 306: 62-69.
 - 15 Akesson A, Larsson SC, Discacciati A, Wolk A (2014) Low-risk diet and lifestyle habits in the primary prevention of myocardial infarction in men: a population-based prospective cohort study. *J Am Coll Cardiol* 64: 1299-1306.
 - 16 Kannel WB, Castelli WP, Gordon T (1979) Cholesterol in the prediction of atherosclerotic disease. New perspectives based on the Framingham study. *Ann Intern Med* 90: 85-91.
 - 17 Bloch KE (1979) Speculations on the evolution of sterol structure and function. *CRC Crit Rev Biochem* 7: 1-5.
 - 18 Cavalier-Smith T (2002) The neomuran origin of archaeobacteria, the negibacterial root of the universal tree and bacterial megaclassification. *Int J Syst Evol Microbiol* 52: 7-76.
 - 19 Ranadive GN, Lala AK (1987) Sterol-phospholipid interaction in model membranes: role of C5-C6 double bond in cholesterol. *Biochemistry* 26: 2426-2431.
 - 20 Haines TH (2001) Do sterols reduce proton and sodium leaks through lipid bilayers?. *Prog Lipid Res* 40: 299-324.
 - 21 Esfahani M, Scerbo L, Devlin TM (1984) A requirement for cholesterol and its structural features for a human macrophage-like cell line. *J Cell Biochem* 25: 87-97.
 - 22 Vance DE, Van den Bosch H (2000) Cholesterol in the year 2000. *Biochim Biophys Acta* 1529: 1-8.
 - 23 Yeagle PL (1985) Cholesterol and the cell membrane. *Biochim Biophys Acta* 822: 267-287.
 - 24 Miao L, Ipsen JH, Bloom M, Zuckermann MJ, Mouritsen OG, et al. (2002) From lanosterol to cholesterol: structural evolution and differential effects on lipid bilayers. *Biophys J* 82: 1429-1444.
 - 25 Awad AB, Fink CS (2000) Phytosterols as anticancer dietary components: evidence and mechanism of action. *J Nutr* 130: 2127-2130.
 - 26 Berge KE, Schultz J, Kwiterovich P, Shan B, Barnes R, et al. (2000) Accumulation of dietary cholesterol in sitosterolemia caused by mutations in adjacent ABC transporters. *Science* 290: 1771-1775.
 - 27 Simons K, Ehehalt R (2002) Cholesterol, lipid rafts, and disease. *J Clin Invest* 110: 597-603.
 - 28 Prior IA, Hancock JF (2001) Compartmentalization of Ras proteins. *J Cell Sci* 114: 1603-1608.
 - 29 Simons M, Keller P, Dichgans J, Schulz JB (2001) Cholesterol and Alzheimer's disease: is there a link?. *Neurology* 57: 1089-1093.
 - 30 Travis AJ, Kopf GS (2002) The role of cholesterol efflux in regulating the fertilization potential of mammalian spermatozoa. *J Clin Invest* 110: 731-736.
 - 31 Mauch DH, Göritz C, Müller EC, Otto A, Pfrieder FW, et al. (2001) CNS synaptogenesis promoted by glia-derived cholesterol. *Science* 294: 1354-1357.
 - 32 Jeong, J, McMahon AP (2002) Cholesterol modification of Hedgehog family proteins. *J Clin Invest* 110: 591-596.
 - 33 Schaefer EJ, Levy RI (1985) Pathogenesis and management of lipoprotein disorders. *N Engl J Med* 312: 1300-1310.
 - 34 Lee M, Jensen B, Regier L (2011) Lipid lowering therapy: Dyslipemia comparison chart. RxFiles drug comparison charts. Saskatoon, SK: Saskatoon Health Region.
 - 35 NIH (2011) NIH stops clinical trial on combination cholesterol treatment.
 - 36 Abourbih S, Filion KB, Joseph L, Genest J, Eisenberg MJ, et al. (2009) Effect of fibrates on lipid profiles and cardiovascular outcomes: A systematic review. *Am J Med* 122: 962. e1-8.
 - 37 Jacobson TA, Chin MM, Fromell GJ, Jokubaitis LA, Amorosa LF (1994) Fluvastatin with and without niacin for hypercholesterolemia. *Am J Cardiol* 74: 149-154.