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Review Article

Overview on Hyperlipidemia in Young Adults

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Abstract

Background: Hyperlipidemia is a relatively widespread disease that involves various inherited and acquired conditions that describe elevated amounts of lipid in the human body or excess low-density lipoprotein (LDL), total cholesterol, triglyceride or lipoprotein amounts greater than 90% compared to normal standards, or HDL levels less than 10% compared to normal standards. Early identification of children with hyperlipidemia is critical when evaluating early measures to avoid further complications.

Aim: In this review, we will look in to the incidence, screening and management options of hyperlipidemia in young adults.

Conclusion: Consideration of lipid screening for any children and young adults (ages 9 - 21) especially the ones with family history of lipid disorders or other comorbidities like obesity or high blood pressure is advised. Intensive drug treatment should be initiated if there are a number of risk factors with a 10-year risk of CVD greater than 20%. Current guidance strongly recommends optimizing risk factors by maintaining a healthy lifestyle throughout life, including young adults.

Keywords: *Hyperlipidemia; CVD Risk Factors; CVD in Young Adults; Hyperlipidemia in Young Adults; Dyslipidemia*

Introduction

Hyperlipidemia is a relatively widespread disease that involves various inherited and acquired conditions that describe elevated amounts of lipid in the human body or excess low-density lipoprotein (LDL), total cholesterol, triglyceride or lipoprotein amounts greater than 90% compared to normal standards, or HDL levels less than 10% compared to normal standards [1]. Cholesterol is a circulating fatty substance most active in the atherogenic procedure. Its origin is twofold: 300 to 700 mg per day is of exogenous source, that is, the result of an excessive intake of dietary fats, especially of animal origin; 800 to 1200 mg per day is the result of an endogenous synthesis, particularly of the liver [2]. Physical inactivity, obesity, abdominal obesity, metabolic syndrome, hypertension, atherogenic diet (high in saturated fatty acids, cholesterol, and sodium), consumption of added dietary sugars, genetic factors (including family history of familial hypercholesterolemia), older age, male sex, and hypothyroidism are all counted as risk factors for hyperlipidemia. Other important causes of hypercholesterolemia and/or rise in triglycerides include diabetes, chronic renal dysfunction, nephrotic syndrome, sedentary lifestyle, as well as overconsumption of animal fats. Hyperlipidemia is also associated with HIV infection, renal transplant, and use of antipsychotic medications and protease inhibitors such as thiazide diuretics, beta-blockers, estrogen-progestin contraception, and antiretrovirals [3].

Early identification of children with hyperlipidemia is critical when evaluating early measures to avoid further complications [4]. Normal values for lipids in children and adolescents are categorized by age, sex and ethnic background. Elevated cholesterol levels in early adulthood raise the risk of CHD developing later [5]. Longitudinal findings indicate that lipid levels appear to rise over time in younger adults [6,7].

The main step is to determine which lipid/lipoprotein defects need to be investigated and whether they require care. Cholesterol can be tested early, i.e. between 6 and 8 years of age. Cholesterol levels at age 22 are recorded to predict the rate of development of CHD over the next 30 to 40 years. Total serum cholesterol > 5.2 mmol/l is raised and should be further tested and likely more managed [8]. Particular attention should be paid to the presence of hereditary hypercholesterolemia: these people can now be diagnosed with molecular genetic techniques and are particularly vulnerable to developing premature coronary heart disease. Sometimes a patient may have multiple lipid/lipoprotein abnormalities [9]. Framingham's analysis of cholesterol levels assessed in young adults to estimate CHD mortality 10 years later [10].

Hyperlipidemia management is usually of a dietary type or is effective with bile acid binding resin (cholestyramine). Such compounds have not been properly tested for efficacy and safety; they may be recommended in specific circumstances, such as patients at extremely high risk. Young people with familial hypercholesterolemia should be especially advised to reduce other risk factors like smoking [11].

In this review, we will look into the incidence, screening and management options of hyperlipidemia in young adults.

Incidence

Atypical lipid values affect 1 in 5 young people and screening values for dyslipidemia (> 95%) include TC > 200 mg/dL, TG > 130 mg/dL, HDL-C < 40 mg/dL, LDL-C > 130 mg/dL, and Non-HDL-C > 145 mg/dL, according to the American Heart Association. At 15 years of age, adults with 11 - 20 years of baseline hyperlipidemia had an average CHD risk of 16.5% compared to 8.1% for adults with 1 - 10 years of hyperlipidemia and 4.4% for those without baseline hyperlipidemia [12].

Lipid disorders prevalence among young adults in the United States was estimated as 53% [27% have high LDL-C, 23% have low HDL-C, and 30% have high triglycerides] [13]. Recent study of the Framingham Offspring Cohort, which involved many young adults at its inception, showed that the length of hyperlipidemia incidence at age 35–55 was correlated with CHD cases [14].

Rationale for screening and screening

According to the asymptomatic complexity of lipid disorders, screening is important for diagnosis. Detection in younger adults with lipid abnormalities may make it easier to incorporate treatment interventions such as dietary change or treatments that may eliminate undesirable cardiovascular outcomes in people at imminent risk of an event or minimize the likelihood of potential events [15]. One prospective cohort study of 2,824 persons ages 18 to 30 years with nonoptimal levels of LDL-C (defined as ≥ 100 mg/dL) at baseline found an association between cumulative exposure to higher LDL-C or lower HDL-C levels and markers of atherosclerosis two decades later.

The 2011 NHLBI recommendations suggest standardized lipid screening for the general public aged 9 - 11 years. CVD risk control recommendations for high-risk pediatric patients include homozygous FH, Kawasaki disease with chronic aneurysms, type 1 and type 2 diabetes, end-stage renal disease, solid organ transplantation vasculopathy, and pediatric cancer survivors prescribe non-fast non-HDL screening every year [16].

NHLBI and other lipid screening studies indicate that overall cholesterol, triglycerides, body mass index, and systolic blood pressure tested at 15 - 18 years of age have reliably identified individuals at risk for adult CVD. Screening for poor lipid health and other risk factors for CVD during between 18 and 24 years of age can better diagnose pre-morbid cardiovascular disease and thus effectively prevent potential vascular problems and/or death [17].

In 2008, the USPSTF recommended screening with a fasting or non-fasting HDL-C level and either TC or a measure of LDL-C. The USPSTF evidence analysis in 2009 of emerging risk factors, including C-reactive protein, leukocyte count, homocysteine and lipoprotein levels, concluded that data was inadequate to justify the use of these risk factors to reclassify individuals at moderate risk for CHD as high risk, although data for C-reactive protein was considered to be encouraging [18].

Screening requires blood testing that can be carried out in a fasting or non-fast condition [19]. While existing guidelines typically prescribe testing of TC and LDL-C levels, they vary with respect to the presence of other lipid components, the age at which to start testing, and the duration of screening [20].

The correlation of natural history and findings found with genetic variants clearly indicates that early therapy at lower LDL-C levels would have a greater impact on lowering the likelihood of ASCVD incidents than on beginning therapy later in life [21].

Management

Preventing the development of other diseases, mainly cardiovascular is the main goal of treating lipid disorders by lowering the LDL-C levels. Treatment decision should be discussed in great detail with the patient based on the risk of the hyperlipidemia [22].

Non-Pharmacological therapy

Primary therapy strategies rely on diet and lifestyle improvements, with the potential inclusion of lipid-lowering drugs if appropriate [23]. Health lifestyle, healthy weight, non-smoking, exercise and a diet low in saturated and trans-fatty acids and high in antioxidants, fruit, vegetables and fatty fish are the cornerstones of hyperlipidemia control [24]. Keys and colleagues have stated that dietary improvements can have an effect on the lipid profile [25]. Dietary adjustment with a safe and balanced diet may offer many benefits, including direct alteration of the lipid profile. Studies have examined the cholesterol-lowering effects of dietary consumption of plant sterols [26]. Recently, an approved evidence-based study in the United States found that n-3FAs, in particular eicosatetraenoic acid (EPA) and docosahexaenoic acid (DHA), have strong cardio-protective benefits, and national and international advisory committees and health groups have begun to call for increased EPA and DHA intakes [27].

A variety of randomized clinical experiments have demonstrated the beneficial impact of fish oils on cholesterol lowering over the years [28]. There is heterogeneity in the results of omega oils, but the human susceptibility to fish oil may be due to the genotype of ApoE [29].

Cocoa products are a rich of flavonoids that will greatly reduce the ratio of LDL and TC: HDL-C. Several meta-analyses have been performed demonstrating the beneficial effects on total and LDL-C of dark chocolate/coca products [30].

Soya contains phytoestrogens that are called isoflavones. Combination of soya foods in association with prebiotic beverages improved

colonic fermentation which may theoretically improve the hypocholesterolemia effects of soya [31,32].

Weight loss therapy for overweight or obese patients will improve LDL lowering and have other health advantages, including the alteration of other lipid and non-lipid risk factors. Specialized nutritionists should be specifically interested in the nutritional care of these patients [33].

Smoking raises TC and decreases HDL-C and improves LDL-C The adverse effects on LDL-C and HDL-C are greater for younger smokers between 8 and 19 years of age. Cigarette smoking withdrawal raises the blood levels of HDL-C but not TC, LDL-C and TG [34,35].

Pharmacological therapy

Although no research have proven that an alternative treatment is superior to statins for either lipid or CVD elimination, multiple studies have demonstrated a significant reduction in plasma lipids with the use of substances such as garlic [36], artichoke extract, psyllium, nuts, plant stanolols, orange juice, soluble fiber, and red yeast rice [37].

A variety of pharmacological trials have demonstrated specifically the positive effects of better lipid profiles. Since these findings show the effects of pharmacological agents and not dietary changes, they help to illustrate the effect of better lipid profiles on CVD morbidity and mortality [38].

The drug of choice is the statin which can reduce LDL-C from 22% to 50%. Statins are used as prescription medicines and are thus relatively affordable [39]. It should typically start with mild statin therapy (e.g. atorvastatin 10 - 20 mg or rosuvastatin 5 - 10 mg) and increase the statin dosage as required reaching LDL-C targets [40]. Mild hyperlipidemia in patients of low incidence ASCVD of less than

7.5 per cent with 10 years of age, low-fat , low-carbohydrate diets and moderate to high-intensity physical exercise along with statins, omega-3 fatty acids and dietary adjustment have been found to have positive benefits as opposed to placebo of minimizing cardiovascular problems [41].

Strong statin therapy (atorvastatin 40 - 80 mg/day or rosuvastatin 20 - 40 mg/day) should be initiated when the LDL-C is greater than 190 mg/dl if the LDL-C target is not reached (usually < 100 mg/dl), additional lipid lowering drugs should be applied [42]. High statin therapy (e.g. atorvastatin 10 - 20 mg or rosuvastatin 5 - 10 mg) should be initiated in patients with risk-free diabetes. Moderate-intensity statin plus ezetimibe should be viewed as an option in patients with acute coronary syndrome that are unable to handle high-intensity statin therapy Patients with ASCVD diabetes or risk factors for intense statin therapy should be introduced [43].

Statins have since been found to decrease adverse accidents in both primary and secondary prevention research [44]. There is a strong and proven advantage of statin therapy in the vast majority of patients, from low risk of high risk, and if there were no side effects and financial restrictions, nearly all patients would be administered statin therapy. The side effects and risks of the drug should be weighed against the possible advantage of the actual patient from taking the prescription [45]. High transaminases, myalgia, myopathy and new-onset diabetes are the main side effects. Myopathy is a major problem because it can lead to rhabdomyolysis and acute renal failure. This risk is raised by some medications as gemfibrozil, nefazodone, macrolide antibiotics, azole antifungals, protease inhibitors, cyclosporine, and other CYP3A4 inhibitors, and multisystem disease [46].

Other treatment options as fibrates, nicotinic acid and fish oils continue to be used by lipid experts, but on a relatively limited scale, in patients with low HDL cholesterol and high triglyceride levels. Cholesterol synthesis inhibitors (ezetimibe) and/or bile acid sequestrants are the next-line medicines for protection in tandem with statins [47].

Conclusion

Consideration of lipid screening for any children and young adults (ages 9 - 21) especially the ones with family history of lipid disorders or other comorbidities like obesity or high blood pressure is advised. Intensive drug treatment should be initiated if there are a number of risk factors with a 10-year risk of CVD greater than 20%. Current guidance strongly recommends optimizing risk factors by maintaining a healthy lifestyle throughout life, including young adults.

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