

Optimising Management of Diabetic Dyslipidemia in Patient: A Case Report

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Abstract

Diabetic dyslipidemia is characterised by high plasma triglycerides (TG), low high-density lipoprotein cholesterol (HDL-C) and increased small dense low-density lipoprotein cholesterol (LDL-C) particles. Obesity, poor glycaemic control, high fat low fibre diet, and smoking increase the risk of dyslipidemia in type 2 diabetes. Recent published reports have suggested beneficial effect of nutraceutical and functional foods, and offer a cost effective alternative in the management of dyslipidemia. Our report presents effective management of dyslipidemia in type 2 diabetics with lifestyle modifications and strict adherence to pharmacological interventions.

Keywords: Diabetic dyslipidemia, Type 2 diabetes, Low high-density lipoprotein cholesterol, Lifestyle modifications

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Introduction

Dyslipidemia, one of the major cardiovascular modifiable risk factors, is characterized by high levels of plasma triglycerides (TG) and small dense low-density lipoprotein cholesterol (LDL-C) particles, and low levels of high-density lipoprotein cholesterol (HDL-C) and insulin resistance [1]. It increases the risk of macrovascular and microvascular complications in type 2 diabetes [2].

We present here a case report of effective management of dyslipidemia in a type 2 diabetic with lifestyle modifications and strict adherence to pharmacological treatments.

Case Report

A 60-year old man with recent-onset type 2 diabetes mellitus had body mass index of 26 kg/m² and hypertension as 140/90 mm Hg. He had a sedentary lifestyle, mild polyphagia, and presented with nonspecific complaints of fatigue and lack of general sense of well-being. The patient had strong positive family history of cardiovascular diseases (CVD), his father had myocardial infarction (MI) which proved to be fatal, mother and elder sister had type 2 diabetes and younger brother had an ischemic stroke 5 years ago. The patient's lungs were clear to auscultate bilaterally, abdomen was soft with minimal diffuse thrombotic thrombocytopenia purpura, no rebound, and no guarding. No bruits were detected on auscultation. Laboratory reports showed HDL-C levels as 40 mg/dL, LDL- as 125 mg/dL, TG as 140 mg/dL, fasting blood glucose as 104 mg/dL, and glycated haemoglobin (HbA1C) as 8%. Whereas, the normal range of

HDL-C, LDL, TG, fasting blood glucose and HbA1C were ≥ 35 mg/dL, 65 - 180 mg/dl, < 150 mg/dL, 60 -110 mg/dl, and $\leq 5.4\%$, respectively. Patient was taking metformin for past 3 months but had poor adherence to treatment. After strict adherence to the prescribed treatment (metformin and atorvastatin) and lifestyle modifications, his HbA1C level improved to 7% and LDL-C dropped to 73 mg/dL at 3-month follow-up. However, there was no significant improvement in HDL-C and TG levels after initiation of atorvastatin. During treatment, the clinician increased the atorvastatin dose to 80 mg/day which further reduced LDL-C level. The high atorvastatin dose was well-tolerated by the patient with no elevations of alanine/aspartate aminotransferase. At 6-month follow-up, the LDL-C level again rose to 85 mg/dL, which was found to be due to suboptimal compliance with the treatment.

Discussion

The present case report highlights how life style modification and strict adherence to treatment can effectively manage diabetic dyslipidemia in type 2 diabetes.

Lifestyle changes, including increased physical activity and dietary modifications remains the cornerstone of management of atherogenic dyslipidemia in type 2 diabetes [3-5]. In our report, when the lifestyle of the patient was modified and he strictly adhered to the treatment as suggested by the physician, his HbA1c and LDL-C levels significantly improved.

Our findings are in concordance with earlier reported literature where intensive lifestyle interventions yielded better long-term

impact on cardiovascular morbidity and mortality in overweight patients with type 2 diabetes than standard diabetes support and education programs [6]. Similarly, stepwise introduction of lifestyle modification with pharmacologic interventions helped to reduce the risk of deaths (53%) due to CVD, nonfatal MI, percutaneous coronary interventions, nonfatal stroke, and coronary artery bypass grafting in patients with type 2 diabetes and microalbuminuria [7].

Statins, the lipid-lowering therapy, is the recommended initial pharmacological treatment for lowering LDL-C levels in “very high risk” and “high-risk” categories of type 2 diabetes. We also suggested atorvastatin in combination with metformin to our patient. After the use of atorvastatin, his LDL-C significantly reduced and with subsequent higher dose of atorvastatin (80 mg/day) his LDL-C levels further decreased with no adverse events. Our results went parallel with earlier reported literature where high-dose statins led to significant reduction in the mean LDL-C levels and in the occurrence of major CV events (CHD, stroke, revascularizations) in comparison to low-dose statins [8]. In 2006, Shepherd et al. [9] reported high-dose statin monotherapy as safe with no treatment-related adverse events and no elevated levels of liver enzymes. Although, statins have represented the evidence-based treatment of choice for reducing LDL-C levels and decreasing cardiovascular events but it is unfortunate that statins are frequently not available, specifically to poor and people with low-income for several reasons including high cost, and also statins cause intolerance, side effects such as myopathy, myalgia, elevation in several hepatic and renal enzyme. Thus, they do not have patient preference, and if prescribed, high chances of nonadherence even with the literate group of patients. In developing and poor economic countries including India, there continues to be low medical education and awareness on effective usage of medications prescribed by doctors. The illiterate and poor patients tend to abruptly quit medication or do not stick to the prescribed dosage regimen of the medication leading to suboptimal use and clinical outcome. Hence, these patients remain undertreated for diseases that can be effectively treated. The interpretation of a recent study in patients with rheumatoid arthritis suggested that patients who were not taking their biological drug on the day agreed with their health-care professional had poorer clinical outcomes than those who did take their drug, emphasising the need for strict adherence to biological therapy in patients with this condition [10]. Strict adherence to treatment is essential to avail maximum benefits of therapy. In our study, we observed that due to suboptimal compliance of the patient to the treatment, his LDL-C levels rose from 75 to 85 mg/dL and the beneficial effects of treatment were abolished. Similar results in terms of higher risk of death, nonfatal MI and loss of beneficial effects of statins with abrupt discontinuation were reported in patients with acute coronary syndrome [11]. Hence, clinicians should underscore benefits of continuing and adhering to the prescribed statin therapy to the patients.

Insulin resistance increases the risk of developing type 2 diabetes and prediabetes. Most of people suffering from prediabetes commonly have insulin-resistance. The American Diabetes Association (ADA) defines pre-diabetes as a metabolic clinical condition which predisposes an individual to a future development

of diabetes [12]. Pre-diabetes is frequently characterized by the presence of impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT). The presence of plasma glycated haemoglobin (HbA1c) level between 5.7% to 6.4% is also a pre-diabetic condition. As per ADA, IFG is defined as presence of a fasting plasma glucose levels between 100 mg/dL (5.6 mmol/L) to 125 mg/dL (6.9 mmol/L); IGT as a 2-h values of plasma glucose in the oral glucose tolerance test between 140 mg/dL (7.8 mmol/L) to 199 mg/dL (11.0 mmol/L) [12]. It has been reported that most people with prediabetes develop type 2 diabetes within 10 years, unless they change their lifestyle such as diet, physical activity. Pre-diabetic condition increases the cardiovascular risk profile of individuals, and IFG and IGT are considered as risk factors for the development of diabetes and conditions associated with the development of macrovascular and microvascular diseases [13]. Further, family history of diabetes is known to increase cardiovascular risk of individuals even if such individuals have no sign of pre-diabetes or diabetes [13]. The patient, in the present case, though had positive family of CVD but did not reveal a family history of diabetes. He himself had elevated HbA1c (8%), indicative of diabetes, and his sister had type 2 diabetes suggesting of a positive family history of diabetes. Dyslipidaemia is known to accelerate the atherosclerotic process and present with morbid consequences, and is one of the major risk factors for CVD in diabetes mellitus. The lipid changes associated with diabetes mellitus are attributed to increased free fatty acid flux secondary to insulin resistance. The availability of multiple lipid-lowering drugs and supplements provides new opportunities for patients to achieve target lipid levels. A nutraceutical is defined as a food (or part of a food) that provides medical or health benefits, including the prevention and/or treatment of a disease, and functional food as any food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains [14]. Nutraceuticals and functional food ingredients that are beneficial to vascular health may represent useful compounds that are able to reduce the overall cardiovascular risk induced by dyslipidaemia by acting parallel to statins or as adjuvants in case of failure or in situations where statins cannot be used [14]. Nutraceuticals and functional foods in dyslipidemia has been reported to act by reducing 7 α -hydroxylase, increasing faecal excretion of cholesterol, decreasing 3-hydroxy-3-methylglutaryl-CoA reductase mRNA levels or reducing the secretion of very low-density lipoprotein [14].

Conclusion

In conclusion, there continues to be considerable lack of knowledge among people in developing countries on dyslipidemia which can be effectively managed in type 2 diabetes patients by life-habit modifications in combination with strict adherence to pharmacological interventions including the use of nutraceutical which may represent a cost effective alternative to manage dyslipidemia or in addition to pharmacological interventions although the role of nutraceuticals in cardiovascular risk protection is still under debate, and clinical studies are still needed to adopt nutraceutical as therapeutics in dyslipidaemia treatment. Therefore, there remains the need to impart awareness on the dosage, potential side effects and benefits of continuing

uninterrupted medication of the prescribed medications in order to optimise the management of dyslipidemia. Nutraceuticals

and functional foods represent a cost effective add-on to pharmacological interventions to optimise diabetic dyslipidemia management.

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