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Mini Review

Oral Hypoglycemic, Lifestyle Modification and Herbal Medication in Management of TYP2 Diabetes Mellitus

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Abstract

Diabetes mellitus is chronic medical condition associated with hyperglycemia. Appropriate and affective management of blood glucose levels are extremely essential specially in gestational diabetes mellitus to avoid fetal complications (macrosomia), also for prevention of micro and macro-vascular complications such as cardiovascular diseases, diabetic nephropathy, retinopathy and peripheral neuropathy. Various options available for management of type 2 diabetes are lifestyle modification, oral hypoglycemic agents and herbal medications.

Keywords: DPP-4 Inhibitor (Sitaglaptin); Fasting Blood Glucose (FBG); GDM Gestational Diabetes Mellitus; Oral Glucose Tolerance Test (OGTT); Random Blood Glucose (RBG); Type 2 Diabetes Mellitus

Introduction

Diabetes Mellitus (DM) is a chronic disease with a state of high blood glucose levels, hyperglycemia, occurring due to deficiencies in insulin secretion and action. The chronic metabolic diseases is major risk factor for long-term macro- and microvascular complications, including cardiovascular, renal and ophthalmic diseases [1]. The clinical diagnosis of diabetes is reliant on either one of the four Blood glucose criteria: elevated (i) Fasting Blood Glucose (FBG) (>126 mg/dL), (ii) 2 h BG during a 75-g Oral Glucose Tolerance Test (OGTT) (>200 mg/dL), (iii) Random Blood Sugar(RBG) (>200 mg/dL) with classic signs and symptoms of hyperglycemia, or (iv) hemoglobin A1C level >6.5%. Recent American Diabetes Association (ADA) guidelines have advocated that no one test may be preferred over another for diagnosis. The recommendation is to test all adults beginning at age 45 years, regardless of body weight, and to test asymptomatic adults of any age who are overweight or obese, present with a diagnostic symptom, and have at least an additional risk factor for development of diabetes [2].

Oral Hypoglycemic Drugs

Various oral hypoglycemic drugs available for lowering blood glucose levels include Biguanides (metformin), Incretin modulators: DPP-4 inhibitor(sitaglaptin), GLP-1 analog (exenatide), insulin secretagogues (glipizide), thiazolidinediones (pioglitazone), alpha-glucosidase inhibitor (acarbose), SGLT2 inhibitor (canagliflozin). Most frequently oral hypoglycemic agents prescribed are metformin and sitaglaptin.

Prediabetes or impaired glucose tolerance, when fasting blood glucose is raised more than normal but does not reach the threshold to be considered diabetes (110-126 mg/dL), predisposes patients to diabetes, insulin resistance, and higher risk of Cardiovascular Diseases (CVD) and peripheral neuropathy [3,4,5]. Type 2 Diabetes Mellitus (T2DM) along with other medical conditions, such as obesity, gestational diabetes (GDM) occurring during the second or third trimester of pregnancy or pancreatic disease associated with cystic fibrosis. Diabetes or Impaired Glucose Tolerance (IGT) may also develop with the use of thiazide diuretics, atypical antipsychotic agents, and statins [6,7].

Studies done by meta-analysis in comparison of metformin, glyburide and insulin on GDM, shown highly affectivity of metformin in treating GDM patients. Metformin is alternative to

insulin and a better choice than glyburide especially those with mild diseases [8,9,10,11]. Study shows no significant risk of maternal or neonatal adverse outcome with the use of metformin [12]. Comparative study on women who were treated with metformin alone, women requiring supplemental insulin had a higher BMI and had higher baseline glucose levels [13]. Metformin was found to provide adequate glycemic control with lower mean glucose levels throughout the day, less weight gain and a lower frequency of neonatal hypoglycemia [14].

A 4-week study, once-daily sitagliptin monotherapy provided effective glycemic control in both the fasting and postprandial states in patients with type 2 diabetes. Sitagliptin produced significant improvements in insulin release and β-cell function. Sitagliptin was generally well tolerated, with a rate of hypoglycemia similar to placebo and no weight gain. Sitagliptin did not lead to changes in hepatic or muscle enzymes [15,16]. Study was performed to provide an assessment of the efficacy and tolerability of sitagliptin at doses of 100 and 200 mg once daily as monotherapy in patients with type 2 diabetes with inadequate glycemic control on diet and exercise. Treatment with sitagliptin provided clinically meaningful reductions in HbA_{1C}, FBG, and 2-h PPG compared with placebo [16].

Life Style Modifications

Lifestyle changes, healthy eating as a strategy, promote walking, exercise, and other physical activities have beneficial effects on human health and prevention or treatment of diabetes [17]. The beneficial effect of the dietary control on diabetes mellitus and glucose metabolism to manage and prevent type-2 diabetes. The dietary pattern should include fat primarily from foods high in unsaturated fatty acids, and encourages daily consumption of fruits, vegetables, low fat dairy products and whole grains, low consumption of fish, poultry, tree nuts, legumes, very less consumption of red meat [18,19,20].

Regular exercise helps the body cells take up glucose and thus lower blood glucose levels. Physical activity also helps with weight loss as well as controlling blood cholesterol and blood pressure. Doctor and dietitian should know about the duration and kind of physical activity and to adjust medication. Doctor should recommend regular physical activity. Important benefits of a regular aerobic exercise program in diabetes management include decreased need for insulin, decreased risk of obesity, and decreased risk for heart disease [21-27].

Herbal Medications

Gymnema sylvestre Schult, the leaves of *G. sylvestre* have been used for treatment of diabetes, hypercholesterolemia, joint pain, and snake bites in India and China [28,29]. Clinical study, the Fasting Blood Glucose (FBG) and HbA_{1C} levels were improved in T2DM patients after receiving 200 mg of ethanolic extract of *G. sylvestre* either daily or their usual treatment for 18 to 20 months. In a second clinical trial, the subjects showed reduced polyphagia, fatigue, blood glucose (fasting and postprandial), and HbA_{1C} in comparison to the control group following an oral dose of 500 mg of herbal extract for a period of 3 months [29]. In an uncontrolled trial involving 65 patients with T1DM and T2DM, the FBG and HbA_{1C} levels were decreased 11% and 0.6%, respectively, after oral dose of 800 mg daily of *G. sylvestre* extract. The leaf extract of the *G. sylvestre* has also been marketed as herbal supplements for diabetic patients.

The mulberry tree (*Morus alba* L.) grows widely in Asian countries, and various substituents of its leaves, *Folium mori*, have been applied clinically proved as hypoglycemic, hypotensive, and diuretic agents [30].

The use of Oral hypoglycemic along with life style modification and dietary modification are most affective in management of Type 2 DM. Natural herbs are useful for prevention and control of type 2 Diabetes mellitus but require longer duration for affectivity.

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