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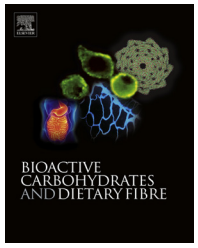

Health benefits of konjac glucomannan with special focus on diabetes

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ABSTRACT

Diabetes mellitus (DM) is one of the most common non-communicable diseases worldwide. The incidence and prevalence of type 2 diabetes is on rise due to population growth, aging, urbanization, and well-known risk factors like obesity, smoking, unhealthy dietary habits and physical inactivity. Effective dietary strategies have an influence on decreasing postprandial plasma glucose burden, including the use of high fiber and low glycemic index diets. Dietary fiber has the ability to improve insulin sensitivity in individuals with type 2 diabetes. Soluble fiber improves satiety by providing bulk and increasing digestion time to slow postprandial glucose uptake, thereby producing lower blood glucose and insulin levels. Glucomannan, a soluble fiber derived from *Amorphophallus konjac* increases transit time of food and prolongs gastric emptying time, which increases satiety, reduces body weight, decreases the ingestion of foods that increase cholesterol and glucose concentrations, reduces the postprandial rise in plasma glucose, suppresses hepatic cholesterol synthesis, and increases the fecal elimination of cholesterol containing bile acids. The aim of the present study was to review the role of dietary fiber in treatment of diabetes with special focus on konjac glucomannan (KGM) to provide readers with a comprehensive understanding of the health benefits of KGM.

Contents

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1. Background

Diabetes mellitus (DM) is one of the oldest diseases, first described by the ancients Egyptians 3000 years ago (Ahmed, 2002). It is a chronic metabolic disorder that results from dysfunction of pancreatic β-cells and progressive failure of insulin secretion superimposed on insulin resistance (Mark et al., 2003) (Fig. 1). Insulin resistance is a condition of reduced responsiveness of insulin-target tissues to normal circulating levels of insulin in blood. The degree to which glucose tolerance in insulin-resistant individuals is affected mainly depends on function of both the magnitude of insulin resistance and the capacity of the pancreas to adequately cope with this defect (Spellman, 2010). The key causes of diabetes are thought to be genetic, weight gain by overeating and physical inactivity. Overeating causes excessive insulin secretion, which negatively affects the insulin secretory capacity from pancreatic β-cells, leading to obesity and insulin resistance (Muoio et al., 2008).

Diabetes is considered as the fourth or fifth leading cause of death in most high-income countries. Almost 23 million of people suffer from diabetes related complications every year (WHO, 2011).. These include vascular complications, (Zimmet et al., 2001), periodontal diseases (chronic gingivitis and periodontitis) (Mealey, 2006; Mealey & Oates, 2007; Taylor et al., 2004; Taylor and Borgnakke, 2008), dental caries (Mattson & Cerutis, 2001; Soell et al., 2007), oral candidiasis (Soell et al., 2007; Taylor, 2008), contributing to substantial oral functional disability (Centers for Disease Control and Prevention dental visits, 2005) and diabetic neuropathy (DN), which is one of the most common diabetes related complications affecting 50–60% of all diabetic patients (Boulton, 2005; Boulton et al., 2005; Hall et al., 2006). The prevalence of diabetes varies from country to country and there is substantial evidence that it is epidemic in many developing and newly industrialized countries (Table 1). The increasing prevalence of diabetes throughout the world is thought to be related to changing life style and dietary habits with consumption of fast-release nature staple carbohydrate foods, which are more refined. Consumption of these foods elevate blood sugar levels rapidly, increasing oxidative stress (Hsu et al., 2007), protein glycation and the risk of development of type 2diabetes (Gavin, 2001). Therefore, dietary management of diabetes needs a rigorous knowledge of blood glucose as well as insulin responses to meals as the treatment targets reduction of postprandial hyperglycemia and hyperinsulinemia. The inclusion of soluble fiber in type 2 diabetic meals had shown to reduce both the postprandial and 24 h glucose profiles

Konjacmannan, a natural constituent of *Amorphophallus konjac* (konjac root), is a highly viscous soluble fiber that has been shown to reduce fasting and postprandial glycemia, and cardiovascular risk factors (Vuksan et al., 2000). Intake of foods containing high content of dietary fiber (DF) is emphasized in the recommendations of most diabetes and nutritional associations. It is thought that viscous and gel-forming properties of soluble DF inhibit macronutrient absorption, reduce postprandial glucose response, and beneficially influence certain blood lipids. Colonic fermentation of naturally available high fiber foods can also be mainly attributed to soluble DF, whereas no difference between soluble and insoluble DF consumption on the regulation of body weight has been observed. However, in prospective cohort studies, it is primarily insoluble cereal DF and whole grains, and not soluble DF that is consistently associated with reduced diabetes risk, suggesting that further, unknown mechanisms are likely to be involved (Liu et al., 2000). Recent research indicates that DF consumption contributes to a number of unexpected metabolic effects independent from changes in body weight, which include improvement of insulin sensitivity, modulation of the secretion of certain gut hormones, and effects on various metabolic and inflammatory

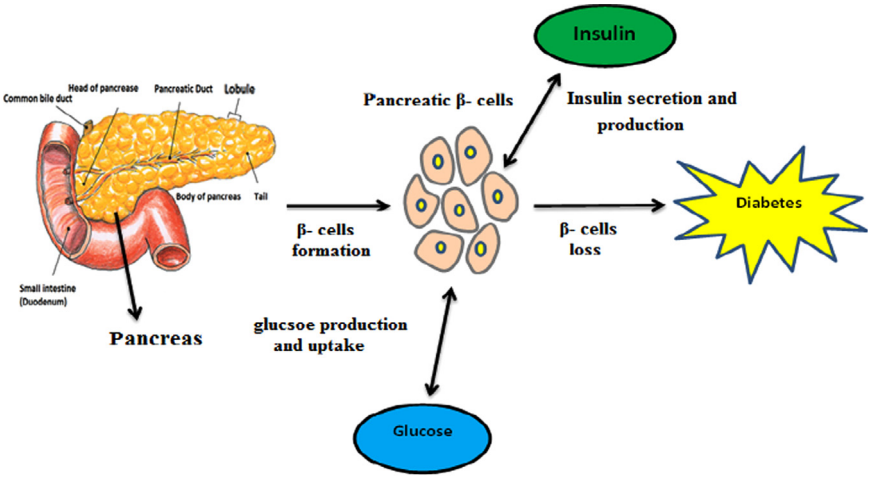

Fig. 1 – Development of diabetes.