CHAPTER 27

NUTRITIONAL SUPPLEMENTS AND THEIR EFFECT ON GLUCOSE CONTROL

Tanya Lee¹ and Jean-Jacques Dugoua*²
¹The Health Centre of Milton, Milton, Ontario, Canada; ²Department of Pharmaceutical Sciences, University of Toronto, Toronto, Ontario, Canada
*Corresponding Author: Jean-Jacques Dugoua—Email: jeanjacques.dugoua@utoronto.ca

Abstract: As diabetes mellitus (DM) continues to be a growing health concern, many people have been turning to natural health products (NHPs) in order to manage this condition, adjunctive to, or even in place of conventional therapies. In order to keep up with this trend, research focussing on the efficacy and mechanisms behind the most common NHPs has been growing amongst the scientific community. The purpose of this chapter is to search and compile scientific literature focussing on the most commonly used NHPs in diabetes treatment, so to educate health professionals on the efficacy, safety and dosage of these products. From our findings, it is apparent that there are promising results from many studies on the potential benefit of NHPs in the treatment of diabetes. Nonetheless, many of the herbs and single nutraceuticals still require further studies in order to confirm safety, dosage and potential interactions with standard conventional therapies. Soluble fibre, alpha lipoic acid, milk thistle, prickly pear cactus and pycnogenol appear to be the most beneficial in the treatment of diabetes.

INTRODUCTION

According to the World Health Organization (WHO), approximately 380 million people have diabetes worldwide, and that this number may well double by the year 2025.¹ Diabetes is a growing health concern where there is a need for both pharmaceutical and natural health products to manage this disease. Another growing health concern is metabolic syndrome, which is a cluster of conditions that increase the risk for heart disease, stroke and diabetes. According to a cross-sectional survey, the incidence of metabolic syndrome

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Diabetes: An Old Disease, a New Insight, edited by Shamim I. Ahmad.
in the United States is 21.8%. According to surveys, the use of complementary and alternative medicine (CAM) by diabetics varies between 8 and 49%.3-7

The use of natural health supplements (NHS) by patients has been gaining popularity, especially in the treatment of Type 2 diabetes mellitus (T2DM). This becomes worrisome as conventional medical practices still have not fully understood the impact that CAMs can have on blood sugars, leaving many physicians in the dark on how to manage patients who are actively taking CAM in conjunction with their conventional medications. It is important that medical practitioners be fully informed on the impact of CAMs in cases where patients choose to self-prescribe.

In this chapter, we have endeavoured to highlight the best scientific evidence available on the impact of CAMs on diabetes (mainly T2DM) and its metabolic parameters. This chapter focuses primarily on clinical evidence, whenever possible.

**SOLUBLE FIBRE**

Dietary fibre has been a dietary staple in the treatment of diabetes mellitus (DM), recommended by health practitioners all around the world. These nondigestible carbohydrates have the ability to lower blood sugar and blood cholesterol levels, making it an effective intervention in the treatment of diabetes mellitus and its comorbidities such as cardiovascular disease.8 Dietary fibre can be categorized based on its solubility in water, leading to viscous (soluble) and fermentational (insoluble) forms of fibre. Many studies have found that soluble fibre has the ability to prevent and treat diabetes mellitus and its complications by aiding in body weight reduction, improving insulin sensitivity, improving blood glucose, HbA1c, and postprandial blood glucose levels, as well as serum lipid levels, while research surrounding the effect of insoluble fibre is still controversial.8 Mechanisms by which soluble fibres work lie in the ability of soluble fibres to swell in the presence of water and delay gastric emptying time. By delaying gastric emptying, the breakdown of carbohydrates is delayed, suppressing postprandial surge in blood glucose and insulin levels.9 Due to these effects, the American Diabetes Association now recommends that those with at high risk of developing T2DM should ingest at least 14 g of fibre per 1000 kcal in their daily diet.10 T2DM increases the risk for other health concerns such as cardiovascular concerns like hypertension and hyperlipidemia. It has been found that 1 g of soluble fibre has the ability to decrease total cholesterol by 0.045 mmol/L.11 There are several types of fibre outlined below found to have profound medicinal benefits on the pathological markers of DM.

**β-Glucan**

β-glucans are polysaccharides consisting of glucose monomers bonded by β-linkages and is a source of soluble fibre commonly found in several plants, grains, algae and the cell walls of bacteria and fungi.12 Although many sources of β-glucans have been studied and found to improve metabolic parameters of diabetes, such as hyperglycemia, hyperinsulinemia, hyperlipidemia and hypertension12 many human clinical studies have focused on the β-glucan-containing grains, such as oats and barley. Preventative effects of β-glucan have been observed in a number of studies. A study performed by Poppit et al (2007) found that high β-glucan containing barley blunted the postprandial increases of blood glucose