Introduction

Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia and in the majority of long standing patients by microangiopathic vascular complications especially in the eyes, kidneys and nervous system ***(Gavin et al., 2003)***.

The development of type 2 diabetes is associated with pancreatic β-cell dysfunction occurring together with insulin resistance. Type 2 manifestes itself clinically in individuals who loss the ability to produce sufficient quantities of insulin to maintain normoglycemia in the face of insulin resistance ***(Kathrin-Maedler et al., 2001)***.

Apoptosis is a mode of programmed cell death. Transduction of apoptotic signals results in cellular suicide. The Fas is a widely occurring apoptotic signal receptor molecule expressed by almost any type of cells. It is also released in a soluble circulating form (sFas) ***(Papathanmassoglou et al., 2000 and Cosson et al., 2005)***.

Several studies on type 2 diabetic patients have found either normal or reduced β-cell mass when compared with normal non-diabetic individuals ***(Sempoux et al., 2001)***. The mechanism underlying this decrease in β-cell mass is increased β-cell apoptosis. Accumulating evidence suggests that apoptosis is the main form of β-cell death in type 2 diabetes ***(Butler et al., 2003)***.

Under diabetic conditions, reactive oxygen species (ROS) are produced mainly through the glycation reaction, which occurs in various tissues and may play a role in the development of complications in

diabetes. Although the induction of the glycation reaction in diabetes was originally found in neural cells and the lens crystalline, which are also known targets of diabetic complications, another target was recently shown to be the β-cell, as the pancreas has a relatively weak intrinsic defense system against oxidative stress ***(Kaneto et al., 2001)***.

Antioxidant include N-acetyl-L-cysteine (NAC) which scavenges hydrogen peroxide, and vitamin C and E which are known dietary antioxidants. Vitamin E is lipophilic and inhibits lipid peroxidation, scavenging lipid peroxyl radicals and the tocopheroxyl radical is produced. Vitamin C a water soluble vitamin, functions cooperatively with vitamin E by regenerating tocopherol from the tocopheroxyl radical ***(Stahl and Sies, 1997)***.

The antioxidant treatment suppresses apoptosis in β-cells without changing the rate of β-cell proliferation, supporting the hypothesis that in chronic hyperglycemia, apoptosis induced by oxidative stress causes reduced of β-cell mass. The antioxidant treatment also preserves the amounts of insulin content and insulin mRNA, making the extent of insulin degranulation less evident. Thus, antioxidant treatment can exert beneficial effects in diabetes, with preservation of in vivo β-cell function ***(Kaneto et al., 1999)***.

Aim of the work

The aim of the present study is to investigate the involvement of apoptosis in the pathogenesis of type 2 diabetes and its chronic complications especially neuropathy; and to find a potential tool for protecting the β-cell function from apoptosis induced by oxidative stress by the use of antioxidants in patients with type 2 diabetes.