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A Short Communication – Vitamin E is a Potent Anti-Diabetic Agent

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Abstract. In recent times, there are many nutritional disorders leading to atherosclerosis resulting in sudden deaths. Some of these disorders include diabetes due to persistent serum hyperglycemia and hyperlipidemia. Since nutrition is in the core-causative of these disorders, nutrition becomes a key fundamental factor in deciphering these disorder epidemics. To this point therefore, vitamin E particularly the tocotrienol rich fraction is to the rescue. Tocotrienol rich fraction has been demonstrated to be the dietary component that aids in controlling and preventing these nutritional abnormalities. This paper briefly discusses the importance of vitamin E, especially as it relates to the tocotrienol rich fraction in the prevention and thus inhibiting of the progression of heart-related diseases, such as diabetes and hyperlipidemia.

Key words: Atherosclerosis, Hyperglycemia, Hyperlipidemia, Vitamin E and Tocotrienols

Introduction

Normal fasting blood sugar level is 5.5 mmol/L or less. Fasting blood sugar level of 5.6 to 6.9 mmol/L is considered as pre-diabetes and 7 mmol/L or higher on at least two separate tests or occasions is an indication that the individual has diabetes (Ford & Sowell, 1999; Tucker & Townsend, 2005). Diabetes therefore is a chronic disease in which the body either cannot produce insulin or cannot properly use insulin it produces. By definition insulin is a hormone that controls the amount of glucose (sugar) in the blood. Diabetes invariably results to high blood sugar levels which can damage organs, blood levels and nerves. The body needs insulin to use sugar as an energy source. There are two types of diabetes, namely types 1 and 2, respectively. Type 1 occurs when the immune system mistakenly attacks and kills the beta cells of the pancreas leading to no or very little insulin being released into the body, resulting in sugar build up in the blood instead of being used for energy (Ford & Sowell, 1999; Tucker & Townsend, 2005). In type 2, the body makes insulin but the body's cells are resistant to the insulin (Ford & Sowell, 1999; Tucker & Townsend, 2005). Overall, therefore diabetes is primarily caused by persistent hyperglycemia. Free radical scavengers effectively prevent the occurrence of diabetes or at least reduce the severity of its complications in animal models and also in types 1 and 2 patients. Persistent hyperglycemia results in oxidative stress due to auto-oxidation of glucose (Devasagayam et al., 2004). Vitamin E is very essential for maintaining numerous functions in mammals, including humans. Biologically, vitamin E in adult human serum is usually in the range of 19 – 29 μM (Ford & Sowell, 1999; Tucker & Townsend, 2005). Low levels or its deficiency will cause or induce the risk for various diseases, including diabetes (Tucker & Townsend, 2005). Free radicals, especially the reactive oxygen species (ROS) are implicated in the onset of diabetes. Furthermore, they have actually been identified in the developments of diabetes and its complex involvement in the complications of the entire process setting in the pathogenesis and progression of diabetes (Lipinski, 2001). This paper briefly highlights the roles of vitamin E in managing diabetes, especially the type 2.

Vitamin E and Diabetes Management

In type 2 diabetes, free radical productions triggers atherogenesis as a result of enhanced formation of glycosylated proteins and advanced glycation end-products and/or possibly by increasing endothelial dysfunction. The total plasma antioxidant capacity susceptibility of low-density lipoprotein (LDL)-cholesterol to oxidation and the eventual excretion of the oxidized

products of arachidonic acid are all increased in proportion to the severity of hyperglycemia. Here, it is very imperative to state that these events are core to the onset of diabetes. Tocotrienol rich fraction has been demonstrated to effectively and efficiently prevented increase in advanced glycation end-products in normal rats and thus induced reduction in blood glucose and glycated hemoglobin in diabetic rats (Wan & Khalid, 2002).

In another independent study by Baliarsingh, Beg and Ahmad (2005) that investigated the therapeutic effects of tocotrienol rich fraction and tocotrienols on serum and lipoprotein lipid concentrations in type 2 diabetic individuals using a randomized double blind placebo-controlled design involving 19 type 2 diabetic patients with hyperlipidemia after 60 days of tocotrienol rich fraction treatment found an average declines of 23, 30 and 42% in serum total lipids, total cholesterol and LDL-cholesterol, respectively. It was thus discovered and confirmed that daily dietary intake of tocotrienol rich fraction by type 2 diabetics prevented atherogenesis and hyperlipidemia and thus can be used as a dependable dietary nutrient to serve as a palliative in a diabetic condition, particularly in the type 2 diabetes scenario.

Conclusions

Vitamin E especially as it relates to the tocotrienol rich fraction is very useful and thus important in the prevention and progression of heart-related diseases, such as diabetes and hyperlipidemia.

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