

Utilization of Antioxidants in the Management of Diabetes Mellitus Patients

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Abstract

Diabetes mellitus is a major public health challenge that is disturbing majority of persons in the society. The prevalence rate continues to rise in the world. It is one of the highest occurring pathological cases seen in many hospitals. It presents with a lot of damages to the system. It affects both the immunological and hematological parameters of the patients. The total antioxidants status is reduced due to hyper metabolism with increased oxidative stress with high level of free radical which will speed up apoptosis and shortening of life if not properly and carefully handled. It is good to use innate immunity and acquired immunity as the defense of the body which antioxidants will enhance. The review was done to educate the public on the benefits for utilization of antioxidants in diabetes mellitus care.

Keywords: Diabetes mellitus; Antioxidants; Insulin resistance

Introduction

This disease diabetes mellitus is a multi-systemic disorder as a result of insulin insufficiency or resistance. This could be due to lack of synthesis and release of insulin or abnormal insulin in metabolizing glucose in blood resulting in high level of sugar in the blood [1]. This excess level of sugar in the blood could be disastrous to the systems causing a lot of damages [2]. The prevalence of diabetes mellitus has been increasing at alarming rate and may be due to eating life styles and sedentary life habits with some chemical exposures from industries and genetic composition. A lot of researchers have been trying to come up with lasting solutions to this burden. This is a disease of the high economic class and the poor also and has no barrier with age of any type of diabetes mellitus these days. It causes depressed immunity leading to immune compromised state resulting to a lot of opportunistic infections. Antioxidants are known to reduce free radicals and build immunity. It becomes imperative to administer antioxidants from foods and fruits to those affected with diabetes mellitus. The management of diabetes mellitus is causing serious economic and health loss. Enough care should be rendered to the patients and utilization of antioxidants will be helpful [2].

Antioxidants

The protective effects of antioxidant defense against free radicals attack may be associated to the disease pathogenesis as some works have revealed decreased antioxidant degree in some diabetic patients [3,4].

It has been shown that free radicals are not completely reduced chemical species that have a single unpaired electron in an outer orbit. Energy produced by these unstable elements is released *via* reactions with adjacent molecules, with the ability to damage lipids, proteins and nucleic acids [5]. Autocatalytic reactions promoted by free radicals

alter sensitive molecule to free radicals to form the chain damage [6,7]. Free radical danger has been linked to many disease situations including diabetes mellitus [7].

Also, some antioxidants like Vitamin E, Vitamin A and ascorbic acid and reduced glutathione in the cytosol [4] hinder the stimulation of free radical damage. Also, some enzymatic systems result to the suppression of free radical reactions. The enzymes are often placed close to the sites of formation of the oxidants. Catalyze present in peroxisomes break down hydrogen peroxide, H_2O_2 ($2H_2O_2 \rightarrow O_2 + 2H_2O$). Superoxide dismutase present in numerous cell types alter superoxide to inactivate molecules, H_2O_2 ($2O_2^- + 2H \rightarrow H_2O_2 + O_2$). This category is reported to involve both the manganese-superoxide dismutase which is present in the cytosol. Glutathione also provides protection against cellular destruction by detoxifying oxygen free radicals.

In fact if there is not enough antioxidant activity, cells manifest sequential biochemical and morphologic changes as they are progressively harmed and actually resulting to apoptosis. In many pathologic conditions, the effect of free radical synthesis is related to the net equilibrium between free radical production and termination [8].

Also to working as an oxygen radical scavenger γ -tocopherol scavenges reactive nitric oxide species and inhibits prostaglandin E2 have been reported to enhance inflammation [9]. Other amine antioxidants serve as lipid peroxide and scavenge ROS [9,10]. Subjects diagnosed with diabetes mellitus have a higher requirement for the antioxidant (Glutathione) to enhance metabolic processes more than healthy individuals.

The total antioxidant status (TAS) is shown to be decreased in diabetic mellitus subjects as a result of elevation of oxygen free radicals (OFRs). Diabetes mellitus subjects are challenged with many complications that could lead to elevation of OFRs to affect the antioxidant status. Proper use of antioxidants in the subjects will be

beneficial to the patients especially in type 2 diabetes mellitus cases [10].

Utilization of Antioxidants in the Management of Diabetes Mellitus

It is reported that oxidative stress play a major role in the formation of vascular complication in diabetes mellitus especially type 2 diabetes mellitus [1,10]. Diabetes mellitus is one of the pathological conditions induced by oxidative stress [10].

Diabetes is a multi-systemic disease. It is a leading public health disease that is raising concern globally. The prevalence continues to rise even in our own society here in Nigeria. There is hyper metabolism in diabetes mellitus resulting to raise oxygen free radicals. This could lead to increased oxidation with reduced antioxidant status. There is every need to supplement antioxidants in the management of diabetes mellitus to build the immunity and longevity of cells. Antioxidants will help to reduce apoptosis thereby improving the life span of the patients. It is advised that the patients should eat foods and fruits rich in antioxidants. Those managing diabetes mellitus patients should encourage them on the benefits of antioxidants because it will help them to recover faster. More hands should be on deck in research in antioxidants use in diabetes mellitus which is becoming a dynamic area so that the patients' lives will become better through changing their health status. Total antioxidant status should be included among routine tests for diabetes mellitus patients. This test will help in monitor the progress of treatment because when the total antioxidant status is low the patient may not improve fast and this will guide the health workers to manage the patients very well. The companies producing fruits containing antioxidants should improve on the quality of their products so as to bring quick recovery of the patients. When the total antioxidant status level is normal it helps the patients to naturally fight the disease.

It is shown that the inhibition of free radical production can provide therapeutic effect to prevent oxidative stress and associated diabetic vascular complications. Supplementation with antioxidants may potentially enhance endothelial dysfunction in diabetes mellitus and decrease vascular NAD (P) H oxidase activity [11]. Supplementation of antioxidants to diabetes mellitus patients especially to type 2 diabetes mellitus will help the body by reducing the free radical generation as a result of hyper metabolism in diabetes mellitus and reduce apoptosis thereby improving the health status of the patient.

Conclusion

Diabetes mellitus is a metabolic disorder that affects the entire systems of the patient with many complications. It brings serious economic and health loss. The rate of productivity in the patients is reduced due to multi-systemic effect of diabetes; therefore something must be done which is the supplementation of antioxidants to the patients. Many treatments have side effects on the patients but antioxidants supplementation has no side effects. Insulin which is the mainstay can cause a serious damage when its administration is not controlled. The use of antioxidants as part of the supplements in the management will help the patients to recover by building up the immune cells and longevity of cells in the body and thereby improving the well-being of the patient. Foods and fruits rich in antioxidants should be given to the patients.

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