

# Alpha-Tocopherol Administration in Diabetics as Preventive and Therapeutic Agents in Oxidative Stress



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## Opinion

Diabetes is associated with metabolic changes causing variety of complications and other chronic diseases. Recently, a broad study has reported cognitive decline in diabetic patient [1], to the rate of Alzheimer's Disease [2] which is in relation to the main theory of the pathology pathway of AD. First theory is the cholinergic reduction and the second, is the oxidative stress. Both theories were seen in diabetics' patient [2].

However, oxidative stress will cause tremendous problems and misbalances to the metabolic and integrated pathways, and could be regulated by our body through antioxidant pathway. Beside other enzymes such as catalase, superoxide dismutase and glutathione peroxidase, a small amount of vitamin will accelerate the antioxidant pathway to reduce oxidative stress, indirectly reducing the complication of diabetes. There are two types of vitamin involved in antioxidant pathway, which are vitamin C and vitamin E. Vitamin E family includes eight natural compounds: four tocopherols and four tocotrienols, named as  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$  respectively.  $\alpha$ -Tocopherol is the most, biologically active member of the vitamin E family of lipid-soluble, chain breaking, non-enzymatic antioxidant compounds exhibiting both antioxidant and anti-inflammatory properties [3].

Alpha-tocopherol (ATF) has the highest bioavailability in human body and is essential for normal neurologic functions. A study showed that reduced plasma ATF levels were found in subject with cognitive impairment [4,5]. This macronutrient has thus, been proposed as a preventive and therapeutic agents in which oxidative and nitrosative stress is promoted by free radical [4,6]. It exhibits both antioxidant and anti-inflammatory properties [7]. Also, ATF stimulates cyclic adenosine monophosphate (cAMP) signaling and has

an immunomodulatory action. Besides, ATF reduces PHA induced pro-inflammatory cytokine and chemokine production. Therefore, vitamin E has thus been proposed as a preventive and therapeutic agents in impairment of neurological function [5,6].

Recent study shows that, tocotrienol (TRF) could be a better agent than ATF or ATF-acetate for use in the prevention of chronic inflammatory disease [8]. TRF is a potent hypocholesterolemic agent [9]. Principally, it inhibits the  $\beta$ -hydroxy- $\beta$ -methylglutaryl coenzyme A reductase activity. Hence, it is a better preventive agent of chronic inflammatory disease-related such as cardiovascular disease. In addition, a study on healthy elderly found that supplementation of TRF decreased DNA damage [8,10]. The same improvement trend was observed in lipoprotein-lipid profile, with reduction in markers of protein and lipid damage in the same study [9]. Furthermore, a finding shows that in ex-vivo study using lymphocytes showed the significant effect of TRF in reversing oxidative stress induced-peroxiredoxin expression [6] and conferred protection against cell [9,11-13].

To the best of our knoweldge, there is a serious need to study the comparison of administritating tocotrienol and  $\alpha$ -Tocopherol towards a new and hemostatically stable therupetics for oxiditive stress, cognitive and metabolic implances in diabetese.

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