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The Plasma Vitamin C and E Status in Type II Diabetes with Malaria in Owerri, Nigeria

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Abstract: The plasma vitamin C and E in type II diabetes with malaria were investigated. Eighty confirmed type II diabetes with malaria aged 45-65 years were selected for the study. Sixty normal subjects free from diabetes and malaria were used as control. The levels of plasma vitamin C and E in type II diabetes with malaria were significantly decreased (60.42 ± 3.7 mmol/L and 8.61 ± 1.12 mg/L respectively) when compared with the control (76.29 ± 9.10 mmol/L and 12.13 ± 1.54 mg/L) ($p < 0.05$). This shows that plasma vitamin C and E are depleted in type II diabetes with malaria. Therefore, there could be an immense benefit in eating foods rich in Vitamin C and E.

Key words: Vitamin C, Vitamin E, type II diabetes, malaria

INTRODUCTION

Type II diabetes is a metabolic disease characterized by pancreatic beta cell dysfunction and insulin resistance in the liver and peripheral tissues (George *et al.*, 2004). It is a multifactorial disease (Turner *et al.*, 1999). Type II diabetes and malaria are the major cause of morbidity and mortality in Owerri, Southern part of Nigeria. Malaria which is caused by the *Plasmodium falciparum* has been reported in the disruption of the red blood cells. The free radicals have been incriminated in the pathogenesis of membrane damage in diabetes as well as malaria. Hence, this membrane damage has been linked to play an important role in generating the cascade process resulting in the cellular death of the tissues (Halliwell and Gutteridge, 2006). In type II diabetes, the production of free radicals increases which affects the antioxidants (vitamin C and E) reactions catalyzed by reactive oxygen-specie scavenging enzyme (Uchimura *et al.*, 1999). This equally happens in malaria infected patients. Also, the free radicals attack proteins, enzymes and DNA and hence causing some pathological derangement (Tirkey *et al.*, 2005). Some nutrients have shown a protective role as antioxidants in restoring the tissue of the cells. Vitamin C which is a water soluble vitamin and non-enzymic antioxidant serves directly by scavenging aqueous peroxy radicals. Also, indirectly regenerate reduced vitamin E (Ojiako and Nwanjo, 2007). Nikki (1991) reports that vitamin C and E are chain breaking antioxidant and could stop the chain of oxidative reactions that lead to disease condition. Kutlu *et al.* (2005) and Nwanjo and Ojiako (2006) reported that the use of vitamin C and E coupled with

moderate exercise have a counteract oxidative stress effect; with the attendant decrease in malondialdehyde which is a marker in oxidative stress. However, since type II diabetes with malaria are prevalent in this part of the world, it is therefore, the purpose of this study to evaluate the level of plasma vitamin C and E. Hence, providing information on the clinical significance of eating foods rich in these vitamin C and E.

MATERIALS AND METHODS

Eighty type II diabetes with malaria confirmed by the method of glucose oxidase (Cheesbrough, 2000) and Geimsha Staining (Cheesbrough, 2000) attending General Hospital Owerri (45 males and 35 females) aged 45-65 years were selected for the study. Sixty normal subjects free from diabetes and malaria were used as control. Informed consent was obtained from all the subjects verbally.

Blood sample: In all subjects, 5ml of veinous blood was collected into EDTA bottles. The plasma samples were obtained by centrifuging the whole blood in a Wisterfuge (model 684) at 2500 g for 10 min and were used for the estimation of plasma vitamin C and E.

Plasma vitamin C was assayed by the 2,4-nitophnyl hydrazine method described by Tietz (1976a). The vitamin E was done by the method of Tietz (1976b) in which vitamin E caused the reduction of ferric to ferrous ion which then forms a red complex with α - α -dipyridyl.

Statistical analysis: The values were expressed as mean \pm standard deviation. The student t test was used to calculate the significant differences at $p < 0.05$.

Table 1: The level of plasma vitamin C and E in type II diabetes with malaria and control

Parameter	Control	Type II diabetes with Malaria	Level of significance
Vitamin C (mmol/L)	76.2±9.10	60.42±3.70*	p<0.05
Vitamin E (mg/L)	12.13±1.54	8.61±1.12*	p<0.05

*significantly different from control

RESULTS

The level of plasma vitamin C and E (Table 1) in type II diabetes with malaria were decreased when compared with the control. This shows that vitamin C and E are depleted in disease condition such as type II diabetes with malaria.

DISCUSSION

Vitamin C and E are important non-enzymic antioxidants involved in cushioning the effect of the free radicals produced in diabetes and malaria (Kutlu *et al.*, 2005).

From the study, it was so observed that the plasma vitamin C decreases significantly in diabetes with malaria when compared with the control ($p < 0.05$). This is in line with the work of Ojiako and Nwanjo (2007). This may be associated with the increase in production of Reactive Oxygen Species (ROS) which causes the reduction in vitamin C. The level of vitamin E was significantly lowered. The type II diabetes with malaria are linked to oxidative stress (Baynes, 1991). Some evidence suggest that oxidative cellular injury caused by free radicals contribute to the development of this disorder (Genet *et al.*, 2002). The reports of research indicating increased oxidative stress and oxidative damage have been demonstrated in the veinous samples from diabetic patients (Singh *et al.*, 2000). This damage may be as a result of Reactive Oxygen Species (ROS) that promotes lipid peroxidation and play essential role in type II diabetes with malaria. The supplementation of vitamin C and E has been described to have an antioxidant effect on some pathological conditions (Ojiako and Nwanjo, 2007).

Having established that the level of vitamin C and E are decreased in type II diabetes with malaria, it is recommended that foods rich in vitamin C and E should be consumed in order to protect the tissue from a high risk of oxidative damage which may be associated with type II diabetes with malaria

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