

## Levels of blood total antioxidants among hypertensives in Abraka, Delta State, Nigeria

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### ABSTRACT

The levels of serum total antioxidant were investigated in sixty-two consenting hypertensives and fifty-eight normotensives selected from the suburb of Abraka in Delta State, Nigeria, using recognized techniques. The total antioxidant values obtained for the male and female hypertensives were  $1.36 \pm 0.20 \text{mM}$  and  $1.53 \pm 0.18 \text{mM}$ , respectively. However, the comparable values for the normotensive subjects are  $1.98 \pm 0.22 \text{mM}$  and  $1.84 \pm 0.14 \text{mM}$ . Hypertension significantly reduces ( $p < 0.05$ ) total antioxidant level in both gender. The role of antioxidant supplementation in the clinical course of hypertension should be explored.

**Key words:** Hypertension, Antioxidant, Normotensive, Abraka.

### INTRODUCTION

Essential hypertension reduces life expectancy and increases mortality rate. It is caused by cluster of factors including cigarette smoking. Smoking is one of the major lifestyle factor influencing human health with life-long cigarette smokers having a higher prevalence to chronic diseases such as atherosclerosis (Sue and Sara, 1993) and associated high blood pressure. Long term smoking of cigarette can result in systemic oxidant-antioxidant imbalance as reflected by increased products of lipid peroxidation and depleted levels of antioxidants like vitamin A, C and E in the plasma of smokers (Frei, *et al.*, 1991). The regulation of blood pressure by nitric oxide has been affected by the increased reactive oxygen species (ROS) which characterize the hypertensive state. Current efforts focus on the influence of smoking on vitamin C status in adults (Schechtman, *et al.*, 1989), the role of antioxidants in macular degeneration and vision loss (AGREDS, 2001), but that in high blood pressure has remained scarcely documented in Abraka, Delta State, Nigeria. This investigation examines the changes

in serum total antioxidant level among some selected cases of hypertension in Abraka.

### MATERIAL AND METHODS

#### Subjects

Sixty-two (62) newly diagnosed cases of hypertension were selected from the Out Patients' Department (OPD), General Hospital, and Delta State University Health Centre, both in Abraka, Delta State, Nigeria. Abraka is a suburban university community located in the Central Senatorial District of the state. The consenting hypertensive patients were aged between 42 and 63 years, consisting of 32 males and 30 females. Fifty-eight (28 males, 30 females) free living, normotensive individuals, matched in age were included as control subjects.

#### Collection of Blood Specimen

About 2ml of blood sample was collected from each consenting subject into plain sterile bottle using the vene puncture technique. The collected whole blood was centrifuged at 1200xg for about 5mins at room temperature ( $29-31^\circ\text{C}$ ) to separate the serum which was decanted into bijoux bottle and stored frozen for analysis which was done within 48 hours.

### Determination of Serum Total Antioxidant Capacity

The total antioxidant capacity was estimated by the inhibition of ABTS (2, 2-diazino-3-ethylbenzthiazoline sulphonate) by metmyoglobin as previously described (Ali, *et al.*, 2000) and the commercial Cayman chemical antioxidant assay kit was used.

### Statistics

The Student's *t*-Test was used to analyse data and level of significance was set at  $P \leq 0.05$  (Ogbeibu, 2005).

### RESULTS

The levels of serum total antioxidant was assessed in sixty-two (62) consenting and newly diagnosed hypertensives, and the result obtained is presented in Table 1.

The serum total antioxidant capacity (TAC) of male hypertensives was lower than their female counterpart (Table 1), but the male normotensives had higher TAC value compared with the normotensive females (Table 1). Overall,

**Table 1: Serum total antioxidant capacity for hypertensive and normotensive subjects**

Subjects	Hypertensive patients		Normotensive individuals	
	Males (n=32)	Females (n=30)	Males (n=28)	Females (n=30)
	Serum total antioxidant capacity (mM)			
	1.36±0.20*	1.53±0.18*	1.98±0.22	1.84±0.14
	Systolic Blood Pressure Measurements (mmHg)			
	172±12*	163±9*	110±6	102±7
	Diastolic Blood Pressure Measurements (mmHg)			
	98±8	95±9	75±3	71±6

Values are expressed as Mean±SD for "n" subjects.

\*Significantly lower ( $P < 0.05$ ) than comparable normotensive value.

\*Significantly higher ( $p < 0.05$ ) than the comparable normotensive value

normotensive males had higher TAC ( $P > 0.05$ ); but hypertension significantly reduced ( $P < 0.05$ ) the capacity when compared with the female counterpart and normotensive male and female subjects.

### DISCUSSION

Patients suffering from essential hypertension have increased reactive oxygen species (ROS) activity which oxidizes nitric oxide (NO) and affects vascular tone. Reactive oxygen species (ROS) cause a wide spectrum of cell damage including enzyme inactivation, lipid peroxidation, protein and lipoprotein oxidation as well as DNA damage (Frei, *et al.*, 1991), and this condition may be complicated by smoking.

Plasma concentrations of some antioxidants have been shown to be significantly lower in even passive smokers (Ali, *et al.*, 2000). The positive associations between cigarette smoking and diseases such as lung cancer and coronary heart diseases have been observed in a population-based study of 451 Australian women investigated between 1982 and 1984 (Andre, *et al.*, 1998).

The result obtained from this present study, showed a significantly ( $P < 0.05$ ) lower total antioxidant capacity values for hypertensives compared with normotensives.

An explanation for the observed reduction in TAC among the hypertensives could be due to the presence of high amount of free radicals and

other oxygen derived (superoxide) species. Short-lived free superoxide and nitric oxide have been shown to react chemically to form highly reactive free radicals such as peroxynitrite that triggers the depletion of plasma antioxidants and increases lipid peroxidation (Chapple, 1997; Padayatty, 2003).

The effects of decreased total antioxidant capacity in hypertension are enormous as the product of lipid peroxidation such as F<sub>2</sub>-isoprostanes reacts chemically to activate inflammatory immune response and complicate coronary heart diseases including hypertension. The effect of antioxidants on the pathogenesis of hypertension should be investigated.

## REFERENCES

1. Agreds., A randomized, placebo-controlled, clinical trial of high dose supplementation with vitamin C and E, beta carotene and zinc for age-related macular degeneration and vision loss. *Arch. Ophthalmol.* **119**(10): 1417-1436 (2001).
2. Ali, A., Ozcan, E. and Abdurrahim, K., Decreased total antioxidant capacity and increased oxidative stress in passive smoker infants and their mothers. *Ped Int'l.* **47**(6): 635-639 (2000).
3. Andre, S.M., John, A.B. and Thomas, E.R., Do cigarette smokers have diets that increase their risks of coronary heart diseases and cancer? *Am. J. Epidemiol.* **137**(5): 521-529 (1993).
4. Chappelle, I.L.C., Reactive oxygen species and antioxidants in inflammatory diseases. *J. Clin. Periodontal.* **24**: 287-296 (1997).
5. Frei, B., Forte, T.M., Ames, B.N. and Cross, C.E., Gas phase oxidants of cigarette smoke induced lipid peroxidation and changes in lipoprotein properties in human blood plasma. *Biochem. J.* **277**:133-138 (1991).
6. Ogbeibu; A.E., Biostatistics: A Practical Approach to Research and Data Handling. Mindox Publishing, Ltd., Nigeria (2005).
7. Padayatty, S., Katz, A., Wang, Y., Eck, P., Kwon, O., Lee, J., Chen, S., Corpe, C., Dutta, A., Dutta, S. and Levine, M., Vitamin C as an antioxidant – evaluation of its role in disease prevention. *J.Am. Coll. Nutr.* **22**(1): 18-35 (2003).
8. Schectman, G., Byrd, J.C. and Gruchow, H.W., The influence of smoking on vitamin C status in adult. *Am. J. Publ Health* **79** (2): 158-162 (1989).
9. Sue, R.W. and Sara, L.A., Nutrition and Diet Therapy. 7<sup>th</sup> (ed.), Mosby, USA (1993).