http://dx.doi.org/10.4314/bajopas.v7i1.7

Bayero Journal of Pure and Applied Sciences, 7(1): 34 – 36
Received: December 2013
Accepted: January 2014
ISSN 2006 – 6996

ANTIOXIDANT VITAMINS STATUS OF HYPERTENSIVE SUBJECTS IN SOKOTO, NIGERIA

***Wali, U., Yeldu M.H. and Muhammad, Y.**
Dept. of Chemical Pathology Faculty of Medical Laboratory Science, Usmanu Danfodiyo University, Sokoto
Correspondence author: usmanwali90@yahoo.com)

ABSTRACT
There is increased evidence that hypertension is associated with increased levels of oxidative stress markers. The current work aimed to estimate blood pressure, vitamins A, C, and E levels in 54 hypertensives attending the outpatient clinic of the Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria and the results compared with those of apparently healthy non-hypertensive volunteers of comparable age and social status. Blood pressure and Serum levels of vitamins A, C, and E were 161.3±23.0/104±14.0mmHg, 25.8±6.6 µg/dL, 0.40 ± 0.2 mg/dL, 0.40 ± 0.1 mg/dL and 123.1 ± 12.3/82.9 ± 9.2 mmHg, 40.3 ± 6.3 µg/dL, 0.7 ± 0.2 mg/dL and 1.0 ± 0.4 mg/dL in hypertensives and non-hypertensive subjects respectively. There was significantly (P<0.05) increased levels of blood pressure and significantly (P<0.05) decreased levels of antioxidant vitamins in hypertensives. Most (80%) of the hypertensives have deficient serum levels of the vitamins. The results suggest that the hypertensives in the study area have low serum levels of antioxidant vitamins, an indication that the hypertensives are predisposed to increased oxidative onslaught.
Keywords: Hypertension, blood pressure, serum vitamins A, C, and E.

INTRODUCTION

Hypertension and other cardiovascular diseases rank among the leading causes of mortality in industrialized nations (Stekelings *et al.,* 2007), the leading and increasing contributor to the global disease burden and are responsible for one third of global deaths (Kidiri, 2005). Hypertension is the most threatening risk factor for stroke, myocardial infarction, heart failure, aneurysms of the arteries, peripheral arterial disease and chronic kidney disease (O'Brien *et al.,* 2007). Increase in the generation of reactive oxygen species and decreased antioxidant activities have been shown to be two or more of the mechanisms of the pathogenesis of hypertension (Dhalla *et al.,* 2000). Oxidative stress may account for endothelial dysfunction, but it is unknown whether this abnormality is a primary event or a consequence of increased blood pressure (John and Schemieder, 2003).

Epidemiological evidence suggests that serum vitamins A, C, and E are potent antioxidants and may play a protective role in the development of chronic diseases including cardiovascular diseases, diabetes, cancers and inflammatory diseases (Coyne, 2005). Hypertension being a degenerative disease, therefore, may be initiated as a result of peroxidation caused by free radicals. Vitamins A, C, and E posses antioxidant properties. Deficiency of these may thus increase susceptibility to the disease and its attendant complications (Packer, 2002). It is expected that this study will stimulate interests, discussion and further studies on the role of antioxidant vitamins vis-à-vis complications of hypertension.

In this study blood pressure and serum vitamins A, C, and E were estimated in hypertensives in Sokoto,Nigeria and the results compared with those of apparently healthy non-hypertensives of comparable socio-economic status.

MATERIALS AND METHODS

Participants: - The subjects randomly employed for this study were 54 hypertensive patients of both sexes who were attending the out patient clinic of the Usmanu Danfodiyo University Teaching Hospital Sokoto, Nigeria. Also 42 apparently healthy non hypertensive participants of both sexes were recruited to serve as control. The consents of all the subjects were sought for and obtained. Ethical committee approval was also obtained for the study.

Blood samples: Blood samples were collected by venipuncture and delivered into clean dry tubes and allowed to clot at room temperature. The samples were centrifuged at 3000rpm for 5 minutes using bench top centrifuge and the serum separated and kept in labeled sample bottles at - 20^{o}C until required.

Reagents: - All chemicals and reagents were of analytical grade and purchased from Sigma Chemical Company, USA.

Analytical Methods: - Serum vitamin A level was determined by method of Bassey *et al.* (1946), vitamin C level was determined by method of Roe and Kuether (1943), and vitamin E level was determined by method of Nield and Pearson, (1967). Blood pressure (Bp) was measured by method of Pickering and White (2008).

Statistical Analysis: - Values were expressed as mean ± standard deviation and separated on the basis of gender. The biochemical parameters were analysed statistically using one way analysis of variance (ANOVA), followed by Turkey Kramer multiple comparison test using Graphpad Instat software. Differences were considered as significant when P<0.05.

RESULTS

The results of the current work showed significant difference (P<0.05) between blood pressure (Bp) and serum antioxidant vitamins of the hypertensives and non-hypertensive participants (Table 1). Gender appears not to have significant (P<0.05) effect on serum antioxidant vitamin.

Table 1: Blood Pressure (BP) and Serum Anxiodant vitamins of Hypertensives in Sokoto, Nigeria.

	Hypertensives			Control		
Parameters	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
N	**27**	**27**	**54**	**23**	**19**	**42**
BP (mmHg)	162±18.2[a]/ 105± 12.3	161± 25.6[b]/ 105± 12.3	161±23.0[c]/ 1040± 14.0	122±9.9[a]/ 82.0± 9.8	121±15.3[b]/ 83± 8.8	123±12.6[c]/ 83.9±9.2
Vit. A (µg/dL)	24.7±7.0[d]	26.8±6.0[e]	25.8±6.6[f]	39.0±6.0[d]	41.7±6.5[e]	40.3±6.3[f]
Vit. C (mg/dL)	0.34±0.2[g]	0.30±0.2[h]	0.40±0.2[i]	0.69±0.2[g]	0.80±0.2[h]	0.70±0.2[i]
Vit. E (mg/dL)	0.48±0.3[J]	0.42±0.3[k]	0.40±0.3[L]	0.84±0.3[J]	1.21±0.1[k]	7.00±0.4[L]

Values are means ± SD. Values bearing same superscript differ significantly (P<0.05) using ANOVA,followed by Turkey Kramer Mutiple Comparison test using Graphad Instat software.

Table 2: Prevalence of Antioxidant Vitamins Deficiencies in Hypertensives in Sokoto, Nigeria.

		Percentage of Subjects with Deficiencies		
Parameters	**Normal Range**	**Male**	**Female**	**Total**
Vit. A (µg/dL)	28 – 42[a]	88.8	81.5	85.2*
Vit. C (mg/dL)	0.4 – 0.8[b]	77.7	85.2	81.5*
Vit. E (mg/dL)	0.6 – 1.3[c]	67.0	81.0	74.0*

[a,b,c]Serum antioxidant vitamins levels for apparently healthy non-hypertensive subjects were used for deciding the normal range in the study area.

* Total pooled values for both the male and female subjects.

DISCUSSION

Hypertension is a consequence of the interaction of genetic and environmental factors. Antioxidant vitamins play critical role in the regulation of blood pressure and subsequent target organ damage. Endothelial and vascular smooth muscle dysfunction initiates and perpectuates essential hypertension. The optimal combination of vitamins and minerals may impact significantly in the prevention and treatment of cardiovascular complications of hypertension (Weder, 1999).

The results of the current study indicate that serum vitamins A, C, and E of the hypertensive patients, in the study area were significantly (P<0.05) lower than the values obtained for the non-hypertensive subjects (controls). The results further reveal no significant difference in levels of vitamins between male and female hypertensive subjects (P>0.05). The implication of this finding cannot be overemphasized. Increased oxidative stress in hypertensive patients result in higher utilization of these vitamins and consequently their deficiencies (Yusuf *et al.*,2012). Thus, increased intake of synthetic or natural antioxidant vitamins could help to reduce or avert hypertension and its attendant complications (Yusuf *et al.,* 2012).

Significant (P<0.05) increased blood pressure in hypertensive subjects compared to controls were as a result of oxidative stress. It has been suggested that oxidative stress plays a critical role in the pathogenesis of endothelial dysfunction and hypertension (Esper *et al., 2006*). The results further revealed that most (80%) of the hypertensives had deficient antioxidant vitamins. This may be connected to increase production of free radicals in hypertension (Sies, 1997). This phenomenon may result into increased utilization of the antioxidant vitamins A, C, and E, which have been used in scavenging the excess amount of free radicals produced which therefore explain the depletion of the vitamins in hypertensive subjects (Sies, 1997).

CONCLUSION

In conclusion, there were significantly higher blood pressure and lower serum antioxidant vitamins in hypertensive subjects, an indication that the hypertensives are predisposed to increased oxidative onslaught. Gender has no significant effect on antioxidant vitamins.

Recommendation

It may therefore be critical to suggest the inclusion of dietary supplementation of these vitamins in the management of hypertensive subjects in the study area.

Acknowledgements

The authors acknowledge the assistance of the Usmanu Danfodiyo University and Usmanu Danfodiyo University, Teaching Hospital, Sokoto, Nigeria.

REFERENCES

Bassey, D. A., Lowry, O. H., Brok, M. J. and Lopez J. A. (1946): Determination of vitamins A. *J. Biochem.*, **166:**177.

Coyne, T. (2005): Antioxidant*, Am. J. Clin. Nutr* **82:** 3685 – 3698.

Dhalla, N. S., Temsah, R. M. and Netticadan, T. (2000): Role of oxidative stress in cardiovascular diseases, *J. Hypertens,* **18:** 655 – 673.

Esper, R. J., Nordaby, R. A., Vilarino, J.O., Paragono, A., Cacharron, J. L. and Machado, R. A. (2006): "Endothelial dysfunction: a comprehensive appraisal," *Cardiovasc Diabetology,* **5**:4 – 11.

John, S. and Schemieder, R. (2003): Potential Mechanisms of impaired endothelial function in arterial hypertension and hypercholesterolemia", *Current hypertension reports,* **5(3):** 199 – 207.

Kidiri, S. (2005): Tackling cardiovascular disease in Africa. *Brit. Med.J.,* **331:** 711 – 714.

Nield, J.B. and Pearson, W. N. (1967): Macro and Micro method of determination of serum vitamin E. Using Triflouro acetic acid. *Nutr.* **79:** 10-20.

O'Brien, E., Beevers, D. G. and Gregory, Y. H. (2007): ABC of hypertension. *BMJ Book London*, **1**-3061 – 4051.

Packer, L. (2002): Alpha Lipoic acid as a biological antioxidants. *J. Free Radical Bio Med.* **20:** 1020 -1032.

Pickering, T. G. and White, W. B. (2008): When and how to use self (home) and ambulatory blood pressure monitoring *J. Am. Soc. Hypertens.,* **2(3):** 119 – 124.

Roe, J. H. and Kuether, C. A. (1943): Determination of vitamin C. *J. Biol. Chem.,* **147:** 399.

Sies, H. (1997): Oxidative Stress Oxidants and antioxidants. *Exp. Physiol.,* **822:** 291 – 295.

Stekelings, U. M., Rettig, R. and Ugner, T. (2007): Angiotensin in the Kidney: A key to understanding hypertension? *Cell metabolism preview,* **5:** 7-8.

Weder, A. B. (1999): Your mother was right: Eat your fruits and vegetables. *Curr hypertens Rep.*, **1:** 11-12.

Yusuf, S., Bilbis, L. S., Suleiman, A. M. and Mu'azu, K. N. (2012): Serum Lipid profile and Antioxidant Status of Salt – induced Hypertensive Rats Treated with an Antioxidants Rich Nutraceutical. *Cameroon J. Expt. Biol.*, **8(1):** 47 – 54.