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Impact of Profession and Diet-Type on Human Oxidative Stress Status

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Abstract: Evidences have shown that diet-type is associated with the level of oxidative stress; however, report on the impact of professional status on oxidative stress level is scanty. The present study assessed the impact of profession and diet-type on human oxidative stress status using self-administered structured questionnaires. A total of three hundred questionnaires were administered to volunteers from management, sciences, and education disciplines. Results indicated some degree of low, moderate and high oxidative stress in individuals from the three professions studied. However, respondents from education (19.2%) showed low oxidative stress risk compared to those in sciences (14.9%) and management (9.6%). Furthermore, under moderate risk category, respondents from management, education and sciences showed moderate oxidative stress of 65.4%, 66.2 and 70.3% respectively. Nevertheless, in the high oxidative stress category, respondents from management profession (25%) showed high risk oxidative damage compared to those from sciences (14.9%) and education (14.7%). The study also showed that high percentage of vegetarians in the study groups were within low and moderate risk categories. This is an implication that profession and diet-type may contribute significantly to the level of human oxidative stress.

Key words: Antioxidant, diet-type, free radical, human, oxidative stress, profession

INTRODUCTION

Oxidative stress is a term used to describe various deleterious processes resulting from an imbalance between the excessive formation of reactive oxygen species ROS and/or reactive nitrogen species RNS and limited antioxidant defenses. Whilst small fluctuations in the steady-state concentration of these oxidants may actually play a role in intracellular signaling (Droge, 2002), uncontrolled increases in the steady-state concentrations of these oxidants can lead to free radical mediated chain reactions which indiscriminately target proteins (Stadtman and Levine, 2000), lipids (Rubbo *et al.*, 1994), polysaccharides (Kaur and Halliwell, 1994) and DNA (LeDoux *et al.*, 1999). It results in massive cell damage inducing cellular mutations, tissue breakdown and immune compromise (Valko *et al.*, 2005).

ROS and RNS are generated from either endogenous or exogenous sources. Endogenous free radicals are generated from immune cell activation, inflammation, mental stress, excessive exercise, ischemia, infection, cancer, and aging. Exogenous ROS/RNS result from air and water pollution, cigarette smoke, alcohol, heavy or transition metals (Cd, Hg, Pb, Fe, As), certain drugs (cyclosporine, tacrolimus, gentamycin, bleomycin), industrial solvents, cooking (smoked meat, used oil, fat), radiation (Parthasarathy *et al.*, 1999; Droge, 2002; Valko *et al.*, 2006, 2007). After penetration into the body by different routes, these exogenous compounds are decomposed or metabolized into free radicals if not neutralized by antioxidants.

Antioxidants are chemical compounds that can prevent, stop, or reduce oxidative damage. It is the balance between the free radicals that are produced and the amount of antioxidants available to prevent or reduce the free radicals that actually determines the amount of tissue damage or oxidative stress a person is undergoing. Thus an adequate intake of antioxidants is highly recommended. One of the ways to ensure adequate intake of the antioxidant nutrients is through a balanced diet consisting of 5-8 servings of fruits and vegetables per day (Berg *et al.*, 2002). However, these can be a constituent of variety of food combinations. Previous report have shown that long term vegetarian have a better antioxidant status than do healthy omnivores (Szeto *et al.*, 2004; Anyasor *et al.*, 2009). Based on these premises, we set out to investigate the possible impact of profession and diet-type on oxidative stress level of humans.

MATERIALS AND METHODS

This descriptive cross sectional study was conducted using 300 volunteers recruited from the school of management, sciences and education in Babcock

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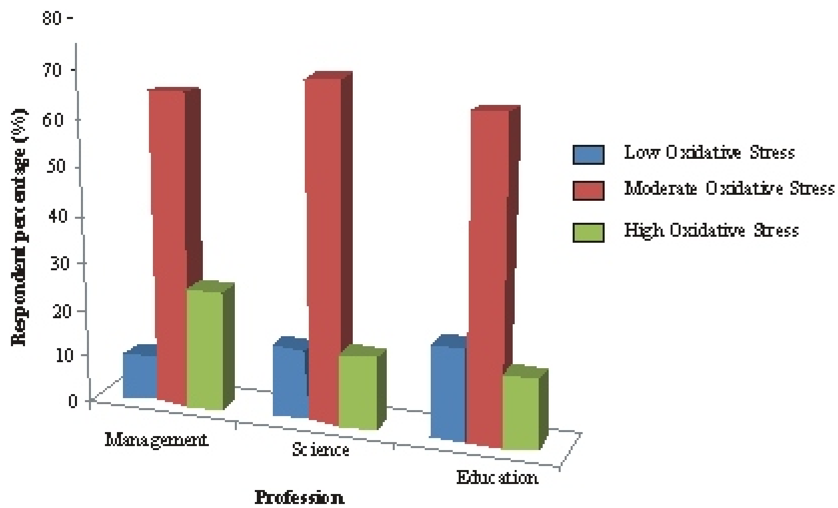

Fig. 1: Percentage of different professionals showing low, moderate and high of oxidative stress

University, Ilisan-Remo, Nigeria from January-March, 2009.

The study was carried out with the aid of structured self-administered questionnaire comprised of few open-ended questions. The questions were grouped into three sections viz. personal data of respondents including vegetarian or non-vegetarian (meat-eaters) group, life style and health and work environment. Studies on oxidative stress based on different professions were grouped into low, moderate and high categories as adapted from Holly questionnaire with little modification (Holly, 2009). Data was analyzed with frequency and percentage using SPSS version 14.0.

RESULTS AND DISCUSSION

The analyzed questionnaires indicated that 52 respondents were from management, 101 from sciences, and 68 from education professions (Table 1). The studied professions exhibited the three categories of oxidative stress i.e. low, moderate and high status (Fig. 1).

From this study, respondents from education constituted 19.1 %; those from sciences constituted 14.9 % while management constituted 9.6% in the low oxidative stress category. This suggests that respondents from education might have lower exposure to free radical attacks than the other two professions. This might have stemmed from less stressful activities, low exposure to harmful substances, high consumption of antioxidant rich diet and healthy lifestyle practice (Hung *et al.,* 2004; Mink *et al.*, 2007). Since free radicals are biological chemicals responsible for the progression of oxidative stress, hence, decreasing free radical production, increasing dietary antioxidant intake, or both may reduce

Table 1: Diet–type in management, sciences and education

	Management	Sciences	Education
Respondents	52	101	58
VEGETARIAN	1	10	5
N.VEGETARIAN	52	91	63
VEG. LOWOXID	NIL	1 (1.0%)	2 (2.9%)
VEG. MOD OXID	NIL	7 (6.9%)	3 (4.4%)
VEG.HIGH OXID	NIL	2 (2.0%)	0
N.VEG. LOW OXID	9.6%	14 (13.9%)	10 (14.7%)
N.VEG.MOD OXID	65.4%	64 (63.4%)	10 (14.7%)
N.VEG. HIGH OXID	25.0%	13(12.9%)43	(63.2%)

VEG - Vegetarian; N.VEG - Non-vegetarian; OXID - Oxidative stress; MOD - Moderate

oxidative stress (Berg *et al.*, 2002; Halliwell and Gutteridge, 2007; Anyasor *et al.*, 2009). Furthermore, assessment of moderate risk category of oxidative stress suggests that respondents from management (65.4%), education (66.2%) and sciences (70.3%) had tendency towards high oxidative stress. However, high oxidative stress observed in respondents from sciences suggested that adequate care should be taken to minimize the risk associated with high free radical load. Previous studies had proved that there are little or no control over endogeneous free radicals produced from normal oxidative metabolism such as respiration and energy metabolism, or as part of normal immune functions (Valko *et al.*, 2007). However, minimizing or avoiding free radical producers such as cigarette smoke, pesticides, excessive exposure sun (UV radiation), air pollution (ozone, smog), X-rays, some drugs and physical trauma like injury or infection may substantially reduce the inclination towards oxidative damage (Mariani *et al.,* 2005). In the high oxidative stress category, respondents from management profession (25%) appeared to have high exposure to free radical damage or oxidative damage compared to those from sciences (14.9%) and education

(14.7%) respectively (Table 1). Nevertheless, respondents from sciences and education should also ensure adequate antioxidant dietary and health management practices. This study also showed that high percentage of vegetarians in the study groups were within the low and moderate risk categories. This indicates that diet type may also contribute to the level of oxidative stress in an individual. This is in agreement with the previous study, which showed that vegetarians exhibited lower oxidant status than non-vegetarians (Szeto *et al*., 2004; Anyasor *et al*., 2009). The study implies that different professional endeavors and diet-type are parts of the determinant factors for oxidative stress status in man.

CONCLUSION AND RECOMMENDATION

The study showed that different professions and diet-type predisposes the individuals to free radical attack and consequently different status of oxidative stress. Professionals in sciences and management were at greater risk to factors associated with oxidative damage such as neurodegenerative diseases including aging, arteriosclerosis, inflammation, Parkinson and Alzheimer's diseases. It is recommended that there should be a reduction in activities that predispose man to generation of free radicals. Intake of diet-type rich in antioxidants such as vegetables and fruits are highly advisable since they contribute to the antioxidant defense system. This system scavenges and subsequently reduces free radicals loads in the body, which cumulates in improving human health.

REFERENCES

Anyasor, G.N., A.A. Ogunnowo and O.O. Omotosho, 2009. Oxidative stress status in vegetarian and non-vegetarians. Acta SATECH, 3(1): 110-113.

Berg, J., J.L. Tymoczko, W.H. Freeman and L. Stryer, 2002. Biochemistry. 5th Edn. United States, WH Freeman and Company, pp: 603.

Droge, W., 2002. Free radicals in the physiological control of cell function. Physiol. Rev., 82: 4795.

Halliwell, B. and J.M.C. Gutteridge, 2007. Free Radicals in Biology and Medicine. 4th Edn. Oxford, UK: Clarendon Press, pp: 214-260.

Holly, L., 2009. Healthy Aging. Retriverd from: http://www.ATDonline.org (Accessed date: December 28, 2009).

Hung, H.C., K.J. Joshipura and R. Jiang, 2004. Fruit and vegetable intake and risk of major chronic disease. J. Natl. Cancer Inst., 96: 1577-1584.

Kaur, H. and B. Halliwell, 1994. Evidence for nitric oxide-mediated oxidative damage in chronic inflammation: nitrotyrosine in serum and synovial fluid from rheumatoid patients. FEBS Lett., 350: 09-12.

LeDoux, S.P., W.J. Driggers, B.S. Hollensworth and G.L. Wilson, 1999. Repair of alkylation and oxidative damage in mitochondrial DNA. Mutat. Res., 434: 149-159.

Mariani, H., M.C. Polidori, A. Cherubini and P. Mecocci, 2005. Oxidative stress in brain aging, neurodegenerative and vascular diseases: An overview. J. Chromatogr., 827: 65-75.

Mink, P.J., C.G. Scrafford and L.M. Barraj, 2007. Flavonoid intake and cardiovascular disease mortality: a prospective study in postmenopausal women. Am. J. Clin. Nutr., 85: 895-909.

Parthasarathy, S., N. Santanam, S., Ramachandran and O. Meilhac, 1999. Oxidants and antioxidants in atherogenesis: an appraisal. J. Lipid Res., 40: 2143-2157.

Rubbo, H., R. Radi, M. Trujillo, R. Telleri, B. Kalyanaraman, S. Barnes, M. Kirk and B.A. Freeman, 1994. Nitric oxide regulation of superoxide and peroxynitrite-dependent lipid peroxidation. Formation of novel nitrogen-containing oxidized lipid derivatives. J. Biol. Chem., 269: 26066-26075.

Stadtman, E.R. and R.L. Levine, 2000. Protein oxidation. Ann. NY Acad. Sci., 899: 191-208.

Szeto, Y.T., T.C. Kwok and I.F. Benzie, 2004. Effect of a long – term vegetarian dietary diet of biomarkers of antioxidant status and cardiovascular disease risk. Nutrition, 30(10): 863866.

Valko, M., H. Morris and M.T. Cronin, 2005. Metal, toxicity and oxidative. Curr. Med. Chem., 12(10): 1161-1208.

Valko, M., C.J. Rhodes, J. Moncol and M.M. Izakovic, 2006. Free radicals, metals and antioxidants in oxidative stress-induced cancer. Mini-review. Chem. Biol. Interact., 160: 1-40.

Valko, M., D.J. Leibfritz, M.T. Moncol, M. Cronin, M. Mazur and T. Telser, 2007. Free radicals and antioxidants in normal physiological functions and human disease. Int. J. Biochem. Cell Biol., 39(1): 44-84.