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Research Paper

Evaluation of Some Mineral Elements and Antioxidant Status In Fibroid Patients in Ado Ekiti, Nigeria.

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Abstract: *An evaluation of the levels of some mineral elements in fibroid patients and non-fibroid patients was carried out in this study. Elements including calcium, magnesium, copper, zinc, iron, potassium and sodium were determined. The results show higher values of sodium and calcium in fibroid patients. However, Iron and Potassium were significantly lowered. The serum level of antioxidants; glutathione peroxidase, superoxide dismutase, Catalase and vitamin C, were also assayed in fibroid patients and non-fibroid patients. However, these antioxidants have a significantly higher levels (P<0.05), in non-fibroid patients. Our findings indicate that there is a decrease in antioxidants level in women with fibroid.*

Keywords: *Fibroid, antioxidants, mineral elements.*

I. INTRODUCTION

Mineral elements are crucial for many body functions which include transportation of oxygen, normalizing of the nervous systems, stimulation of growth and maintenance and repair of tissues and bones. Some of these elements are needed in small-amounts (few milligrams) per day, because when it is absorbed in excess, it is toxic to health and could cause damage to body system (Henry 2001). Examples of mineral elements include; Zn, Fe, Cu, Mg, and Na. Some of these serve as cofactors for many enzymes (Cohn and Nay, 2000). Antioxidants are molecules that neutralize harmful compounds called free radicals that damage living cells. Antioxidants can take the form of enzymes in the body, vitamin supplement or industrial additives. They are routinely added to oils, foodstuffs, and other materials to prevent free radical damage (Halliwell and Gutteridge,1999). Oxidation reactions can produce free radicals which start chain reactions that damage cells. Antioxidants terminate these chain reactions by removing free radical intermediates, and inhibit other oxidation reactions by being oxidized themselves. As a result, antioxidants are often reducing agents such as thiols, ascorbic acid or polyphenols (Naidu 2003). One of the major causes of fibroid is an imbalance in the level of estrogen and progesterone present in women (Oyeyemi and Akinlua, 2013). Excess estrogen fuels the growth of fibroid tumor. Antioxidants such as beta-carotene, vitamin C, glutathione peroxidase, and superoxide dismutase, help in stimulating the production of progesterone in other to suppress the effect of the excess estrogen. Glutathine peroxidase is the general name of an enzyme family with peroxidase activity whose main biological role is to protect the organism from oxidative damage.

The biochemical function of this enzyme family is to reduce lipid hydroperoxide to their corresponding alcohols and to reduce free hydrogen peroxide to water (Blackburn *et al* 2000). Superoxide dismutase converts the peroxide radical to hydrogen peroxide (Noor *et al* 2002). Catalase protects cells from oxidative damage by breaking down hydrogen peroxide which is generated during cell metabolism (Defeng and Arthur, 2003).Vitamin C or L-ascorbic acid is essential to a healthy diet as well as being a highly effective antioxidant (Naidu,2003). It acts as a reducing agent to reverse oxidation in aqueous solution. When there are more free radicals in the body versus antioxidant, a human is under the condition called oxidative stress. Fibroid, which is a benign tumor of the uterus and the cervix is of paramount medical interest. It can become cancerous with time (Ojo and Oyeyemi, 2013). Although some studies have been carried out on fibroid, in many areas, but in this study we investigated the effect of fibroid on some mineral elements and antioxidants.

II. MATERIALS AND METHODS

This present study was carried out in the department of chemical pathology, university of Ado-Ekiti, teaching hospital, Ado Ekiti, Ekiti State, Nigeria. The study included both women with uterine fibroids and women without fibroids. All the subjects were coming as out- patients of the hospital. The subjects were divided into two groups.

Group A included 60 subjects of normal women without fibroid, while group B were made up of 80 women with uterine fibroid.

Blood Sampling

Blood samples were drawn from all the subjects using plain bottles and, serum was separated by centrifuging the blood at 3000rpm for 10mins at 4^0C. This serum was used for the estimation of trace elements including Ca, Mg, Cu, Zn, Fe, k and Na. Antioxidants including glutathione peroxidase, superoxide dismutase, Catalase and vitamin C were also estimated.

Biochemical Assay

The presence fibroid growth was ascertained using an ultra-sound scan machine.Analysis of Zn, Fe, Ca, k, Mg, Na and Cu in the serum samples were carried out by the method of AOAC,1990. Glutathione peroxidase was assayed by the method of Paglia and Valentine,1967, Superoxide dismutase was estimated by the method of Beauhamp and Fevovish,1976, Catalase activity was analysed by the method described by Rhavakrishnan and Sarma,1963.Vitamin C was analysed by the method of Lee and Coates, 1999.

Statistical Analysis

The results obtained was grouped and expressed as mean ± Standard Error of Mean (SEM). The data collected was analyzed using one –way Analysis of variance (ANOVA) and Duncan multiple range test to compare the data obtained from the experiment to those of the control (Zar, 1986).

III. RESULTS AND DISCUSSION

Table 1: Plasma level of some trace elements in women without uterine fibroid (A) and women with uterine fibroid (B).

Groups	Ca^{2+}(Mg/L)	Mg(Mg/L)	Na(Mg/L)	Fe(Mg/L)	K(Mg/L)	Cu(mg/L)	Zn(Mg/L)
A	111.79 ± 33.7^{a}	22.58 ± 1.63^{c}	307.4 ± 2.20^{e}	6.93 ± 0.73^{a}	205.4 ± 0.4^{a}	1.28 ± 0.43^{h}	0.75 ± 0.20^{j}
B	184.8 ± 18.95^{b}	21.28 ± 4.98^{c}	371.6 ± 2.94^{f}	3.72 ± 0.70^{b}	190.1 ± 0.3^{b}	1.37 ± 0.59^{h}	0.59 ± 0.169^{j}

N.B: Value with different superscript are significantly different at (P>0.05).

Table 2: Plasma level of some antioxidants in women without uterine fibroid (A) and women with fibroid (B).

Group	GPx (mmol/L)	SOD (mmol/L)	Vit C (g/L)	Catalase (U/L)
A	1.78 ± 0.20^{b}	3.66 ± 0.55^{d}	46.41 ± 1.56^{f}	12.6 ± 4.63^{h}
B	1.26 ± 0.18^{a}	2.23 ± 0.26^{c}	35.87 ± 1.98^{e}	6.96 ± 3.67^{i}

IV. DISCUSSION

In this present study, the concentrations of some mineral elements in fibroid patients were determined. The concentrations of Calcium and Sodium were found to increase significantly in fibroid patients. Potassium and Iron concentrations reduced significantly. This result correlates with the report of Ross (1955), which linked increase in the levels of Na and Ca and reduced K, to a raised level of Oestrogen level in the absence of pregnancy is a factor in the growth and development of fibroid. Akinlua and Ojo,2013 also reported increase in the levels of Na and Ca in fibroid patients.

The study also evaluated the activities of antioxidant enzymes; Superoxide dismutase (SOD), Glutathione Peroxidase (GPx) , Catalase as well as the concentration of Vitamin C in the fibroid patients. Results showed significant reduction in all the antioxidant enzymes and Vitamin C in fibroid patients, thus pointing to increase in oxidative stress in fibroid patients. This result is in agreement with some earlier works done. Uterine fibroids have been reported to be characterized by an impaired antioxidant cellular system (Fletcher *et al* , 2013). Also oxidative stress has been shown to be a major player in common profibroitic gynecologic disorders such as fibroids (Vural *et al*,2012, Rahman,2007).

V. CONCLUSION

It can be said conclusively from this study that mineral elements; Na, Ca, K and Fe are implicated in fibroid cases. Hence diet and suppliments containing these should be considered in managing fibroid patients. Furthermore , the significant reduction observed in fibroid patients signifies increased oxidative stress in fibroid cases. Therefore, antioxidant suppliments may be considered as a factor in managing fibroid.

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