

# Serum Level of Superoxide Dismutase, Malondealdehyde and Uric Acid among Artisans in Cross-River State, Nigeria

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## ABSTRACT

Oxidative stress and oxidative damage to tissues are involved in the path physiology of many diseases. Many occupations, most especially crafts are associated with the generation of high levels of free radicals and hence increased post-oxidant level. This study evaluated the serum level of Superoxide dismutase, Malondealdehyde and uric acid of artisans in Cross-River State, Nigeria. The results reveals that the SOD level in all the artisans did not show any significant change at  $P < 0.05$ . However, MDA level in mechanics ( $4.53 \pm 0.25$ ), Welders ( $4.42 \pm 0.20$ ) and spray painter ( $4.00 \pm 0.06$ ) where all significantly lower when compared with the control ( $3.14 \pm 0.09$ ) at  $P < 0.05$ , thus indicating increased per oxidation but the reverses was the case for carpenters where no change was observed compared with the control. More so, determination of uric acid level showed that mechanics ( $2.71 \pm 0.31$ ), welders ( $3.98 \pm 0.22$ ), Battery repairers ( $3.40 \pm 0.37$ ) marked significance difference compared with control ( $5.86 \pm 0.28$ ) though similar trend was seen in carpenters ( $5.72 \pm 0.20$ ) and spray painters ( $4.22 \pm 0.25$ ). All groups of artisans were compared with the control at  $P \leq 0.05$  level of probability. Thus, this work has opened up the occupational hazard associated craft Men or artisans and the possible health implications associated with their jobs and hence recommend more safety guides and increased anti-oxidant nutrients consumptions.

**Keywords:** *Superoxide Dismutase, Malondealdehyde, Uric-acid, Artisans.*

## 1. INTRODUCTION

An artisan (from Italian: artigiano) is a skilled manual worker who makes items that may be functional or strictly decorative, including furniture, clothing, jewelry, household items, and tools ( Keirse, 1998). The term can also be used as an adjective to refer to the craft of hand making food products, such as bread, beverages and cheese. Manufactured by hand and with hand tools imparts unique and individual qualities to artesian products, in contrast to mass produced goods where everyone is nearly identical. Artisans traditionally work with media such as stone, wood, ceramics, glass, common and precious metals, basketry, textiles, esparto grass, leather, fur, wax, paper, and flowers ( Keirse, 1998). Some of the artisans are; vulcanize, Painters, mechanics, carpenter, gold smith and other craft workers. Because of the nature of their jobs, they are highly exposed to various fumes from the raw materials they used. Most of these material are toxic chemical (reagents), metals and in most cases heavy metals, for example cadmium (Cd), Lead (Pb) Zinc (Zn), Copper (Cu), Mecury (Hg) Gold (Hu) etc. (Rodionova, 2007). Glutathione peroxides (PDB 1GPI, EC 1.11.1.9) is the general name of an enzyme family with peroxides activity whose main biological role is to protect the organism from oxidative damage. The biochemical function of glutathione peroxides is to reduce lipid hydro peroxides to their corresponding alcohols and to reduce free hydrogen peroxide to water (Halliwell, 1995). Uric acid is a heterocyclic compound of carbon, nitrogen, oxygen, and hydrogen with the formula  $C_5H_4N_4O_3$ . It forms ions and salts known as orates and acid orates such as ammonium acid orate. Uric acid is created when

the body breaks down urine nucleotides. High concentrations of uric acid in blood serum can lead to a type of arthritis known as gout. The chemical is associated with other medical conditions like ammonium acid orate kidney stones. Moreso, malondealdehyde is the end product of lipid per oxidation (LPO), arising from the free radical degradation of polyunsaturated fatty acids, can cause cross-linking in lipids, proteins and nucleic acids. Human body is equipped with various antioxidants like superoxide dismutase (SOD), glutathione peroxides (GSHPx) and catalase (CAT) which can counteract the deleterious action of ROS and protect from cellular and molecular damage. Though, artisans contribute greatly to the technological advancement in their own way via craft production, ranging from traditional to modern tool which aid and support life, the health hazard which they are exposed to cannot be over emphasized. Thus, it is pertinent to get an inside into the oxidative stress indices in artisans and their possible risk of developing oxidative stress diseases and other related pathology compare to non artisans (Halliwell, 1995).

## 2. MATERIALS AND METHODS

### a. Apparatus

Sterile syringes needles, sample bottles, bathroom weighing balance, syphygno meter, centrifuge, refrigerator, spectrophotometer.

## b. Chemicals

All chemical used were of analytical grade purchase from the British Dry Home (BDH), England. Reagent varieties were also purchased from sigma and Dialed.

## c. Subjects

Subjects were selected after each volunteer subject had filled and returned a pre-tested structured questionnaire. Subjects who were regarded were medically examined at Mount Zion Clinic, Caliber to ascertain their state of Health. Those who were medically certified as healthy and were non smokers, were not on any medication and had not suffered from malaria or any ailment within the past one month were selected. Artisans who had seen in the trade for over 5 years and were certified healthy were also selected as the test population. Civil servants (darks, Higher Executive Officers, secretaries) were used as the reference population. The study population were aged 22 – 40 years. A total of 35 civil servants were used as controls. The Artisan comprised of (25), welders (19), carpenters (20), Spray painters (19), and Battery repairers (14).

## d. Biochemical Assays

All Biochemical assays for superoxide dismutase, malonaldehyde and uric acid were carried out using standard methods.

The method of Das et al. (1990) was used for the determination of malonaldehyde, superoxide dismutase was assay using the method of Soufflé, 1986, while uric acid was analyzed using the methods of Searcy et al, 1967.

## e. Statistical Analysis

Data obtained was expressed as Mean  $\pm$  Standard Deviation and analyzed using the Analysis of Variance 'ANOVA; f-ratio' (Welkowitz 1976) and student 't' test where applicable. Values at  $P < 0.05$  were considered significant.

## 3. RESULTS

The result obtained showed that the serum level of SOD in mechanics (2.80+0.41), welders (2.82+0.30) and Battery repairers (2.58+0.22), compares well with each other but where in significantly lower when compared with the normal subjects or control (3.86+0.39) at  $P < 0.05$  significant level but indicate trace increased level of free radicals. However, those of carpenters (3.22+0.22) and spray painters (3.46 $\pm$ 0.28) compares favorably well and did not show any significant different when compared with the normal control still at  $P < 0.05$ . Statistical evaluation also reveals that the MDA level in mechanics (4.53+0.25) welders (4.42+0.09), Battery repairer (4.75+0.20) and spray painter (4.00+0.06) where all significantly higher when compared with the normal control (3.14+0.09) at  $P < 0.05$ . Furthermore, the MDA level of carpenters (3.19+0.12) compare favorably well with the normal control (3.14+0.09) at  $P < 0.05$  probability level. However, the result for uric acid has also showed that the uric acid level of mechanics (2.71+0.31), welders (3.98+0.22) and Battery repairers (3.40 + 0.32) where all significantly lower when compared with the normal control (8.86+0.28)  $P < 0.05$  but the uric acid concentration of carpenters (5.72+0.02) once again compares well with that of normal control (5.86+0.28) while that of spray painter (4.22+0.25) was slightly but insignificantly lower when compared with the normal control (5.86+0.28) at  $P < 0.05$ .

**Table 1:** the serum level of sod, mda and uric acid in artisan  
In c.r.s

Group	SOD iu/l	MDA mmol/ml	Uric acid mg/dl
Control	3.85+0.39	3.14+0.09	5.86+0.28
Mechanics	2.80+0.41	4.53+0.25*	2.71+0.31*
Welders	2.82+0.30	4.42+0.20*	3.98+0.22*
Battery Repairs	2.58+0.22*	4.25+0.20*	3.40+0.37*
Carpenters	3.32+0.22	3.19+0.12	5.72+0.20
Spray Painters	3.46+0.28	4.00+0.06*	4.22+0.25*

\* $P \leq 0.05$  vs Control

## 4. DISCUSSION

Sequel to the afore going results obtained and reported above, though there where slight fluctuation in the SOD level in all experimental groups but however the change where within normal range which indicate

low free radical load. Furthermore, the MDA level observed for mechanics, welders, Battery repairers and spray painters indicate increased in free radical load occasion by increased in per oxidation and may be triggered by high level of heavy metals these artisans are

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exposed to eg Lead, Nickel, steel etc. Thus, raising an alarm on possibilities of certain toxicities ranging from hepatocellular to nephrotoxicity and even to a long term tendencies of onchogenicity except counter balanced by significant levels of anti-oxidants in their diet or reduce job hazard. Moreover, the significance decreased in the serum uric acid level of mechanics, welders, Battery repairers and spray painters point at numerous causes, one of which is low dietary zinc intakes (Hess et al, 1977). Xanthine oxidase is a Fe-Mo enzyme, so people with Fe deficiency (the most common cause of anemia in young women) or Mo deficiency can experience hypouricemia. Sevelamer, a drug indicated for prevention of hyperphosphataemia in patients with chronic renal failure, can significantly reduce serum uric acid (Garg et al 2005). In conclusion, from the above discussions, it is an eye saw that artisans in Cross River state are exposed to high level of free radicals as part of job hazard and hence posing serious health insecurity to them either at short or long term basis.

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