ORIGINAL RESEARCH PAPER

Volume-8 | Issue-2 | February-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY OF TOTAL ANTIOXIDANTS CAPACITY OF SERUM IN HYPERURICEMIA PATIENTS WITHOUT GOUT

Biochemistry

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ABSTRACT

The antioxidants like Vitamin C, tocopherol, bilirubin uric acid glutathione peroxidase prevent free radical damage to proteins, carbohydrates, lipids and DNA by scavenging them. Uric acid is an antioxidant but may cause gout. The study includes 40 hyperuricemia patients without gout to exclude inflammation associated with gout and equal number of controls. The concentration of trolox antioxidant capacity was measured by chemical method. Uric acid level was measured with auto analyzer. It has been found that there is significant increase in trolox antioxidant capacity among hyperuricemia patients which is statistically highly significant ($p<0.0001$). Researchers have observed that hyperuricemia even without gout may damage to various organs such as heart. The study concludes that even though there is increase in trolox antioxidant capacity(TAC) but in spite this increase there is no benefit to the heath as proved by earlier studies.

KEYWORDS

Introduction

Antioxidants delay oxidation of oxidizable substrates such as proteins, Lipids, Carbohydrates and DNA when present in low concentration [1,2].They mainly prevent the destructive effects of free radicals [3]. The damage by free radicals to the macromolecules present in the body may cause atherosclerosis, cancer, Diabetes mellitus and aging. Free radicals are produced by environmental stresses such as drugs, inflammation and diseases such as Diabetes mellitus. Our body contains various defensive mechanism against these free radicals such as glutathione peroxidase, ascorbic acid(vitamin C), Vitamin E, Bilirubin and uric acid.

Total antioxidant capacity of serum or any sample is the measurement of scavenging capacity free radicals scavenged by a test solution [4,6,7]. Uric acid present in our body is an antioxidant.There are various methods by which we can measure the Total antioxidantcapacity(TAC) of a sample [5].

Hyperuricemia is a condition in which there is an increase in uric acid levels. This may lead to hyperuricemia without Gout or hyperuricemia with Gout.Uric acid is. Uric acid is synthesized both by de novo purine synthesis and its catabolism and also by the alimentary intake of nucleic acid absorption and catabolism. It is the final product of purine nucleotide metabolism. Purines are also salvaged and catabolized to uric acid [8,9,10].Further it is established that despite its antioxidant level it has adverse effect to health [11].

Materials and methods:

The study was done at the Department of Biochemistry, Patliputra Medical College, Dhanbad, during the period ofApril 2018 to October2018. An informed consent was taken by the subjects for the study.

Inclusion Criteria

Male Patients in the age group 25 to 40 years with serum uric acid level 6.5 mg/dL who do not show any sign and symptoms of gout.

Exclusion Criteria

Hyperuricemia patient with any chronic illness such as Diabetes mellitus, auto inflammatory disease, cancer, Tuberculosis, on anti-inflammatory drugs or any acute illness such as viral or bacterial infection.

A total of 80 subjects including 40 hyperuricemia male patients of age group 20 -40 years without Gout along with forty male controls (with normal uric acid level) were considered. The upper limit of consideration of hyperuricemia was 7mg/dl.

Sample collection and storage:

5ml of venous blood was withdrawn by peripheral venipuncture. It was centrifuged at 10,000 rpm for 5 minutes and after separation of serum it was stored at -20 C.

Measurement of Total antioxidant capacity:

Trolox equivalent antioxidant capacity (TEAC) assay is generally based on the ability of antioxidants presenting in a sample in reduce or inhibit oxidized products generated in the assay. It is based on the principle that when ABTS (2,2'-azino-bis(3-ethylbenz-thiazoline-6-sulfonic acid) is incubated with a proper chemical, an ABTS radical (ABTS+) is formed. The ABTS+ has a blue-green color, with maximum absorptions at 650, 734 and 820 nm. Antioxidants in the sample reduce ABTS+ suppressing this color production to a degree that is proportional to their concentrations [4]. In human plasma, TEAC measures mainly albumin (that represents 43-53 % of the total value) and uric acid (representing 33 %). In addition, it measures ascorbic acid, α-tocopherol, and bilirubin [4,13]. The reaction rate is commonly calibrated with Trolox, a water soluble analogue of vitamin E, and assay results are expressed in mmol trolox equivalent/L [4,13,14]. This method is suitable for automation permitting rapid throughput of samples.

Measurement of serum Uric acid levels:

Erba EM 360 auto analyzer was used for the measurement of uric levels by enzymatic method based on picric acid.

Results and Discussion

The serial dilution of trolox antioxidant capacity was done. The absorbance was taken in spectrophotometer. The absorbance of trolox antioxidant capacity of cases and controls were taken by the same method.Serum uric acid level of both cases and controls were measured with autoanalyzer. Table 1 represents the descriptive statistics of the cases and control.

Table 1: Descriptive Statistics

	Total no of sample	Mean ± Std. deviation
Case	40	0.7738 ± 0.14352
Control	40	0.7438 ± 0.19809
Age in Years	40	30.73 ±6.520

The mean and standard deviation for trolox antioxidant capacity for cases was 0.77 ± 0.14 and for the controls it was 0.74 ± 0.19. Age distribution of the subjects has been shown in figure 1. The mean age of the subjects was 30.73 ± 6.52.

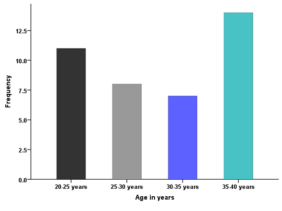

Figure 1: Age distribution of subjects

The standard curve for trolox antioxidant capacity was calculated and is shown in Figure 2.

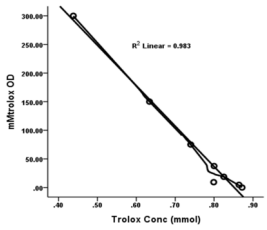

Figure 2: Trolox Antioxidant Capacity curve

It has been observed by correlation studies that the trolox antioxidant capacity was significantly higher among hyperuricemia patients in comparison to controls and was statistically highly significant ($p<0.0001$) which depicts in hyperuricemia there is increase in trolox antioxidant capacity. However it has been observed by earlier studies (10] there are no benefits of increased trolox antioxidant capacity among these patients but the present study concludes that although uric acid is a potent antioxidant its increase in serum level is not beneficial.

Conclusion

It had been observed that antioxidants have only beneficial effect to our health but the present study concludes that even with the increase in antioxidant levels, they have doubtful benefit to the health. The study concludes that even though there is increase in trolox antioxidant capacity (TAC) but in spite of that increase there is no benefit to the heath.

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