The effect of vitamin C on laboratory tests in haemodialysis patients: is there a relationship between the administered vitamin C dose and serum uric acid levels?

Sir,

Many drugs change the laboratory test results [1]. Ascorbic acid is a widely self-administered compound. Interference with the results of laboratory tests has been well-documented with ascorbic acid, because as a reducing agent, it interferes with colorimetric redox assays [2–5]. Vitamin C support is recommended in haemodialysis patients because of diet limitations and losses with dialysis [6,7]. Although the effect of vitamin C on laboratory tests was evaluated in normal subjects and patients with malignant disease [2–5,8,9], there is no such knowledge about haemodialysis patients. Administration of vitamin C to a geriatric or sick patient with impaired renal or metabolic function may result in additional changes in laboratory profiles. Therefore, we investigated the effect of different doses of vitamin C usage on laboratory tests in haemodialysis patients.

This study was performed on 55 stable (27 male, 28 female) haemodialysis patients. Vitamin C supplements were discontinued in all patients 3 months before the beginning of the study. The patients were divided into four groups regarding age, sex and dialysis hours. Three of the groups received 100, 1000 and 2000 mg/day vitamin C therapy for 3 months. Thirteen were referred as control group and did not receive vitamin C therapy. Prior to dialysis session at the onset, first, second and third months of the treatment, blood samples

Table 1. Uric acid levels of haemodialysis patients

	Pre-T	First month	Second month	Third month
Control group	7.1 ± 1.2	6.8 ± 1.4	7.3 ± 2.1	7.0 ± 1.3
100 mg vitamin C	6.4 ± 1.2	6.1 ± 1.7	5.8 ± 1.6	6.7 ± 2.0[b]
1000 mg vitamin C	6.7 ± 1.3	2.7 ± 2.1[a,d]	3.4 ± 1.9[b,d]	4.3 ± 2.4[c,e]
2000 mg vitamin C	7.0 ± 1.1	4.3 ± 2.8[a,e]	3.7 ± 3.1[b,e]	4.5 ± 3.1[c,f]

[a] $P < 0.0001$, compared to pretreatment value.
[b] $P < 0.001$, compared to pretreatment value.
[c] $P < 0.01$, compared to pretreatment value.
[d] $P < 0.0001$, compared to control group.
[e] $P < 0.01$, compared to control group.
[f] $P < 0.05$, compared to control group.

were obtained. The following tests were performed with Technicon Dax System Methods Manual (Technicon Instruments Corp. Tarrytown, NY, USA): uric acid, total protein, albumin, globulin, total and direct bilirubin, glucose, cholesterol, triglyceride, alkaline phosphatase, creatine kinase, lactate dehydrogenase, aspartate aminotransferase and alanine aminotransferase.

Ascorbate leads to well-known confusions in biochemical values related to oxidation of redox dye [10]. Ascorbic acid is known to falsely increase values for apparent uric acid as measured by the phosphotungstate method used with the SMAC [3]. In contrast, it artifactually decreases uric acid values assayed by the uricase dye oxidation procedure used on autoanalyzer II [4,11]. In our study, the effect of the lowest dose vitamin C led to a net positive interference whereas higher doses produced a net negative interference. Besides, we observed a decrease in uric acid level with the highest doses of vitamin C which started to increase with the prolongation of the treatment (Table 1). Aspartate aminotransferase levels can be erroneously elevated while erroneous decreases can occur with serum bilirubin and lactate dehydrogenase [2–5,12]. Serum glucose, triglyceride and cholesterol levels were measured lower than real levels [10]. We did not find any significant change in other laboratory parameters studied.

Our results suggest that the relationship between the vitamin C dose and serum uric acid levels can be complex. Detailed investigations are needed to evaluate whether our results are due to the physiological changes in urate production and elimination, or due to analytical interferences.

Department of Nephrology
Uludağ University Medical School
Bursa
Turkey

Alpaslan Ersoy
Kamil Dilek
Mahmut Yavuz
Mustafa Güllülü
Mustafa Yurtkuran

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