Seasonal Changes in Vitamin A and β -Carotene Levels in Chronic Hemodialysis Patients

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Table 1. Comparison of serum vitamin A, β -carotene, cholesterol and triglyceride levels of patients at the beginning and end of summer

Dear Sir,

Hypervitaminosis A is a frequent observation in patients with chronic renal failure (CRF) undergoing chronic hemodialysis [1]. The consumption of foods providing vitamin A is known to be subject to seasonal variations. In this study, serum vitamin A, β -carotene, cholesterol and triglyceride levels of 30 patients in a chronic hemodialysis program were determined. Children with weight-for-height values < 90% of standard and adults with body mass index < 20 kg/m² were considered as malnourished patients. Wilcoxon's signed rank test for unpaired groups and correlation analysis for paired groups was used for statistical analysis. Patients' mean age was 44.1 ± 22.8 years and the mean duration of dialysis was 18.7 ± 12.3 months. At the beginning of summer, the mean vitamin A and β -carotene levels were 45.3 ± 15.2 and 160.1 ± 71.8 μ g/dl respectively, whereas at the end of summer, they were 49.6 ± 27.1 and 247.8 ± 101.3 μ g/dl. At the beginning and end of the season, the difference between mean serum β -carotene levels was statistically significant ($p < 0.001$) though it was not between mean serum vitamin A levels ($p > 0.05$). Linear regression analysis showed a positive correlation between serum vitamin A and β -carotene levels at the end of summer ($r = 0.885$, $p > 0.05$). But, at the beginning of summer, serum levels of vitamin A and β -carotene were not found to correlate with each other ($r = 0.07$, $p > 0.05$). There were no statistically significant differences between mean levels of cholesterol and triglyceride at the beginning and end of summer ($p > 0.05$) (table 1).

Comparing serum vitamin A and β -carotene levels of well-nourished and malnourished patients at the beginning and end of summer, no significant difference was found to be present ($p > 0.05$). Serum vitamin A and β -carotene levels of patients correlated neither with duration of hemodialysis nor with age of patients ($p > 0.05$).

Vitamin A can be provided from meat, fish, liver, butter and eggs as retinol and from vegetables and fruits as carotenoids. Though retinol can almost fully be absorbed from intestine, only one third of β -carotene can be absorbed. Therefore, heavy ingestion

of β -carotene results in elevation of serum levels, but due to the restricted conversion of β -carotene to retinol, hypervitaminosis A can rarely be seen [2]. In this study, serum β -carotene levels were evaluated during a period characterized by high ingestion of vegetables and fruits. At the beginning of summer, serum β -carotene levels were found to be higher than normal in 23 (76.6%) patients. At the end of summer, they were high in 25 patients (83.%). In the literature, elevations in serum vitamin A levels have been attributed to elevation in serum β -carotene, triglyceride and

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cholesterol levels [3]. In this study, we found a positive correlation between serum vitamin A and β -carotene levels but not between serum vitamin A and cholesterol and triglyceride levels. We did not observe serum vitamin A levels to increase to toxic levels being consistent with the data in the literature [4]. It has been reported that, when duration of hemodialysis increased, some minimal decrease in serum vitamin A levels could be observed [3]. We could not observe any correlation between duration of hemodialysis and serum vitamin A levels. This observation can be explained by the increase in food intake during this period. The absence of relationship between nutritional status of patients and serum vitamin A and β -carotene levels implies that in hemodialyzed patients, vitamin A metabolism is mostly affected by factors related with hemodialysis rather than nutritional status.

In result, seasonal changes in food intake, though restricted because of the renal dysfunction in patients, causes significant elevations in serum β -carotene levels of hemodialyzed patients with CRF. Some minimal elevations never increasing to toxic levels can be observed in serum vitamin A levels.

References

- Gentile MG, Manna GM, D'Amico G, et al: Vitamin nutrition in patients with chronic renal failure and dietary manipulation. *Contrib Nephrol.* Basel, Karger, 1988, vol 65, pp 43-50.
- Marcus R, Coulston M: Fat-soluble vitamins; in Gilman AG, Goodman LS, Nies AS, Taylor P (eds): *The Pharmacological Basis of Therapeutics*, ed 8. New York, Pergamon Press, 1990, pp 1553-1571.
- Maher JF: Pharmacological considerations for renal failure and dialysis; in Maher JF (ed): *Replacement of Renal Function by Dialysis*, ed 3. Dordrecht, Kluwer Academic, 1989, pp 1018-1076.
- Kaul L, Tizabi Y: Vitamins: Fat soluble; in Pradhan SC, Maickel RP, Dutta SN (eds): *Pharmacology in Medicine: Principles and Practice*. Baltimore, SP Press International Inc, 1986, pp 532-539.

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Nephron 1996;74:466-467