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LETTER TO THE EDITORS

Serum trace element concentrations in children with chronic renal failure

Imad F. Btaiche

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Sirs,

I read with interest the study by Esfahani et al. [1] on serum trace element levels in children with chronic renal failure. I would like to note the limitations and confounding variables that may have affected the study results and conclusions.

First, zinc concentrations were not measured in the spent dialysate. As such, possible zinc losses via the hemodiafilter cannot be ascertained. Second, the use of body mass index (BMI) to compare the nutritional status between the three study groups with the aim of comparing body trace element status is inaccurate. BMI relates a person's body weight to their height and is not an indication of nutrient reserves. The absence of significant difference in the BMI between different groups does not necessarily translate to similar trace element body stores. Third, it is stated that study results showed "an inverse linear relation between the duration of hemodialysis and serum levels of zinc". This conclusion does not necessarily indicate that there were more zinc losses with longer duration of hemodialysis as stated in the conclusion "with the severity of the changes increasing with the duration of hemodialysis". Chronic renal failure patients treated with long-term hemodialysis can be sicker and have poorer dietary intake. Poor nutritional intake may as well be the cause of zinc deficiency. Last, chronic renal failure and uremia can be associated with tissue trace element redistribution. Studies in patients with renal failure requiring intermittent hemodialysis have shown plasma zinc concentrations to be decreased or increased [2–7]. A decrease in serum zinc concentrations due to tissue zinc redistribution occurs during stress as part of the acute phase response and may not necessarily indicate zinc deficiency. Trace element redistribution is mediated by the release of cytokines, especially tumor necrosis factor-α (TNF-α) and interleukin-6 [8]. Significantly higher serum concentrations of TNF-α and interleukin-2 were found in pediatric chronic hemodialysis patients compared with healthy subjects. Serum concentrations of TNF-α, interleukin-6 and interleukin-2 were comparable before and after the hemodialysis session [9]. This indicates that chronic renal failure patients may have elevated serum cytokine concentrations. In the study by Esfahani et al. [1], serum trace elements were collected before hemodialysis. It is unlikely that timing of trace element collection may have been affected much differently whether sampling occurred before or after the hemodialysis session. Thus, cytokine effects on serum trace element redistribution may have been similar before or after hemodialysis.

Although trace element disturbances have been reported in uremia and renal failure patients, the clinical implications of these disturbances and the direct implication of hemodialysis on trace element status remain to be fully elucidated.

I. F. Btaiche (✉)
Department of Pharmacy Services,
University of Michigan Hospitals and Health Centers,
UH B2 D301 - Box 0008, 1500 East Medical Center Drive,
Ann Arbor, MI 48109-0008, USA
e-mail: imadb@umich.edu

References

1. Esfahani ST, Hamidian MR, Madani A, Ataei N, Mohseni P, Roudbari M, Haddadi M (2006) Serum zinc and copper levels in children with chronic renal failure. Pediatr Nephrol 21:1153–1156
2. Marumo F, Tsukamoto Y, Iwanami S, Kishimoto T, Yamagami S (1984) Trace element concentrations in hair, fingernails and plasma of patients with chronic renal failure on hemodialysis and hemofiltration. Nephron 38:267–272
3. Tsukamoto Y, Iwanami S, Marumo F (1980) Disturbances of trace element concentrations in plasma of patients with chronic renal failure. Nephron 26:174–179

4. Zima T, Mestek O, Nemecek K, Bartova V, Fialova J, Tesar V, Suchanek M (1998) Trace elements in hemodialysis and continuous ambulatory peritoneal dialysis patients. Blood Purif 16: 253–260
5. Zumkley H, Bertram HP, Lison A, Knoll O, Losse H (1979) Aluminum, zinc and copper concentrations in plasma in chronic renal insufficiency. Clin Nephrol 12:18–21
6. Chen CK, Liaw JM, Juang JG, Lin TH (1997) Antioxidant enzymes and trace elements in hemodialyzed patients. Biol Trace Elem Res 58:149–157
7. Krachler M, Wirnsberger GH (2000) Long-term changes of plasma trace element concentrations in chronic hemodialysis patients. Blood Purif 19:138–143
8. Gaetke LM, McClain CJ, Talwalkar RT, Shedlofsky SI (1997) Effects of endotoxin on zinc metabolism in human volunteers. Am J Physiol 272:E952–E956
9. Zwolinska D, Medynska A, Szprynger K, Szczepanska M (2000) Serum concentration of IL-2, IL-6, TNF-alpha and their soluble receptors in children on maintenance hemodialysis. Nephron 86:441–446