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# Electrolyzed-reduced water reduced hemodialysis-induced erythrocyte impairment in end-stage renal disease patients

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## Abstract

Chronic hemodialysis (HD) patients increase erythrocyte susceptibility to hemolysis and impair cell survival. We explored whether electrolyte-reduced water (ERW) could palliate HD-evoked erythrocyte impairment and anemia. Forty-three patients undergoing chronic HD were enrolled and received ERW administration for 6 month. We evaluated oxidative stress in blood and plasma, erythrocyte methemoglobin (metHb)/ferricyanide reductase activity, plasma metHb, and proinflammatory cytokines in the chronic HD patients without treatment (n=15) or with vitamin C (VC)- (n=15), vitamin E (VE)-coated dialyzer (n=15), or ERW treatment (n=15) during an HD course. The patients showed marked increases (15-fold) in blood reactive oxygen species, mostly H<sub>2</sub>O<sub>2</sub>, after HD without any treatment. HD resulted in decreased plasma VC, total antioxidant status, and erythrocyte metHb/ferricyanide reductase activity and increased erythrocyte levels of phosphatidylcholine hydroperoxide (PCOOH) and plasma metHb. Antioxidants treatment significantly palliated single HD course-induced oxidative stress, plasma and RBC PCOOH, and plasma metHb levels, and preserved erythrocyte metHb /ferricyanide reductase activity in an order VC>ERW>VE-coated dialyzer. However, ERW had no side effects of oxalate accumulation easily induced by VC. Six-month ERW treatment increased hematocrit and attenuated proinflammatory cytokines profile in the HD patients. In conclusion, ERW treatment administration is effective in palliating HD-evoked oxidative stress, as indicated by lipid peroxidation, hemolysis, and overexpression of proinflammatory cytokines in HD patients.

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