

MODULATION OF COPPER DEFICIENCY INDUCED OXIDATIVE STRESS BY DIETARY POLYPHENOL IN THE RAT

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The mechanism of injury during Cu deficiency may result from a reduction in antioxidant defenses. Since polyphenol compounds possess antioxidant properties, the present study was undertaken to determine whether rutin supplementation to Cu-deficient rats protects the animals against the severity of Cu deficiency. Weanling male Wistar rats were fed a purified diet for 6 weeks, containing sucrose as the sole dietary carbohydrate and were assigned to one of 3 groups: Cu-adequate, Cu-deficient, and Cu-deficient, rutin supplemented (1%). The Cu concentrations of the diets were 0.6mg/kg (deficient diets) and 6mg/kg (control diet). Cu-deficient rats had a lower body weight and higher relative liver and heart weight than control rats, but there was no mortality in any group. Cu-deficient rats had lower liver Cu concentrations and hematocrit values. Rutin supplementation of Cu-deficient rats does not protect against these consequences of Cu deficiency. Cu-deficient rats had decreased plasma antioxidant capacity (measured as trolox equivalent) compared to control rats. After exposure of tissue homogenate to iron induced lipid peroxidation, thiobarbituric acid reactive substances (TBARS) were significantly higher in heart from deficient rats compared to control rats. Rutin supplementation of Cu-deficient rats ameliorated the antioxidant status as indicated by a significant increase in plasma antioxidant capacity and a significant decrease in susceptibility of heart to *in vitro* peroxidation. In conclusion, Cu-deficient rats are more susceptible to peroxidative damage. Rutin administration ameliorates the antioxidant status of Cu-deficient rats but is unable to provide a complete protection against the pathological consequences of Cu deficiency. The results suggest either the effects of Cu deficiency are not limited to reduced antioxidant defenses, or the effects of decreased Cu, Zn, SOD activity cannot be completely counteracted by antioxidant supplementation.