Reno-Protective Effect of Exogenous Glutathione on Experimentally Induced Acute Kidney Injury in Male Rats

Yahya M. Naguib MBChB, MSc, PhD, MD*,** Eman I. Elgizawy MBChB, MSc, MD**

ABSTRACT

Background: Acute kidney injury (AKI) or Acute renal failure (ARF) refers to the sudden damage or failure of the kidney within few hours or days and resulting in acute deterioration of the renal functions. If not properly treated, AKI may lead to chronic renal failure and possibly renal transplantation. The aim of the present study was to evaluate the role of exogenous glutathione (GSH) on ciprofloxacin (GFX)-induced AKI. We also studied the effect of glutathione administration on some genes of interest.

Methods: Forty male Wistar albino rats were equally divided into 4 groups. The control group received intra-peritoneal injection of distilled water for 15 consequent days. The GSH treated group received concomitant intra-peritoneal injection of distilled water and glutathione (200 mg/kg/day) for 15 consequent days. The CFX treated group received concomitant intra-peritoneal injection of distilled water and ciprofloxacin (800 mg/kg/day) for 15 consequent days. The CFX+GSH treated group received concomitant intra-peritoneal injection of CFX and CSH for 15 consequent days. Serum levels of creatinine, urea, cystatin C and GGT were measured. Renal CYP4F1, GPx, GSR gene expression was evaluated.

Results: Exogenous GSH had no significant effect on the kidney functions or the studied genes when compared to the control group. Treatment with CFX resulted in significant increase ($P<0.05$) in creatinine, urea, cystatin C and GGT serum levels when compared to the control group. CFX treatment also significantly ($P<0.05$) down-regulated renal GPx, GSR mRNA levels, while it up-regulated renal CYP4F1, when compared to the corresponding values in the control rats. Serum levels of urea, creatinine and cystatin C were significantly lower ($P<0.05$) in CFX+GSH group when compared to the CFX treated rats. There was significant up-regulation ($P<0.05$) of the renal, GPx, GSR and down-regulation of CYP4F1 mRNA levels in the CFX+GSH group when compared to the corresponding values in the CFX treated group.

Conclusion: Our results suggest a potential prophylactic and possibly therapeutic roles of exogenous GSH administration in the treatment of drug-induced AKI. We also demonstrated that the underlying mechanism could be explained, at least in part, by the antioxidant and gene modifying properties of GSH.

Key words: Acute kidney injury, oxidative stress, glutathione, ciprofloxacin, CYP4F1

Bahrain Med Bull 2021; 43 (2): 501 - 505