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Garlic and Kidney Injury Protection

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Dear Editor,

Recently much attention has been directed toward attenuation of renal tubular cell injury by herbal antioxidants (1-3). Medicinal plants are plentiful sources of polyphenols with antioxidant activities and these beneficial properties have been attributed to their antioxidant mechanisms (4-6). There has also been a linear association between oxygen radical absorbance capacity values and total phenolic contents in several herbal medicines (7-12). Garlic (*Allium sativum L*) is an important part in the complementary and alternative medicine (13, 14). To investigate the ameliorative effect of garlic extract on renal biochemical and histologic alterations of gentamicin-induced kidney damage in rats, we conducted a preclinical investigation (15). In this study, we found attenuation of gentamicin-induced acute kidney injury by garlic juice in male rats. In this study, fifty male rats were divided into 5 groups of 10 as follows: group 1, sham group (control); group 2 (positive control group), gentamicin (GM) for 10 days; group 3, garlic and GM for 10 days; group 4, GM for 10 days followed by garlic juice for 10 days; and group 5, GM for 10 days followed by saline solution for 10 days. GM, 10 mg/kg, and garlic extract, 20 mg/kg, were administered intraperitoneally. In our study, we found serum creatinine were significantly high in the gentamicin group (group 2) after the experiment. However, the level of creatinine in group 3 (co-treatment with gentamicin and garlic) were significantly lower than those in group 2. Serum creatinine also lower in group 4 (consecutive treatment with gentamicin and garlic), when compared with group 5 (gentamicin and saline). We also assessed the pathology damage score. Histopathological study, showed the higher injury for GM group. Post-administration of garlic after GM treatment (group 4) or co-administration of garlic and GM (group 3) significantly attenuated the damage score. In this study, we concluded that, garlic extract, has regenerative potential after tubular injury induced by GM in animal models (15). Additionally, to find the efficiency of co administration of garlic extract and metformin for prevention of gentamicin–kidney tubular cell injury, we conducted another investigation on 70 male rats (16). The results of this study showed that metformin and garlic juice or their combination has both curative and protective effect against gentamicin renal toxicity (16).The protective effect of the garlic derived antioxidant S-allylcysteine on kidney injury and oxidative stress induced by ischemia and reperfusion was shown previously (15, 16). It was found, that garlic have high level of antioxidant activity. The S-allylmercaptocysteine as one of the water soluble organo-sulfur compounds of garlic juice scavenges hydroxyl radical and abolishes oxidative and nitrosative stress. Interestingly, it was found that, the equivalent antioxidant capacity values of several forms of garlic extracts were associated well with their total phenolic, flavonoid and flavonol contents (1). Diabetic kidney disease is one of the most important complications of diabetes mellitus (17-21), and metformin has been mostly used for treatment of this disease (13, 14, 22-25). Thus it is possible that garlic extract protects against tubular injury induced by diabetes and restoring the biochemical alterations and modulation of oxidative stress on the tubules (3, 24). Furthermore, in diabetic kidney disease, there is also tubular cell injury due to glycosuria (26-28). These findings can more potentiate the clinical use of combination of metformin and garlic extract in diabetic patients to protect better the kidneys. In our studies, we showed co-administration or post-administration of garlic for GM-induced acute renal injury was applicable (23, 25-31). Thus, we conclude that garlic is a kidney protective drug to improve tubular injury by GM or other nephrotoxic drugs which act like the same mechanisms as the aminoglycoside does. However in this regard, to better understand the garlic renal protective properties, more animal and clinical studies are suggested.

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