Sarmistha Saha, J Biotechnol Biomater 2015, 5:7
http://dx.doi.org/10.4172/2155-952X.C1.046

OMICS International
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412th OMICS International Conference

World Bio Summit & Expo

November 02-04, 2015 Dubai, UAE

Antiurolithic effect of phytochemicals: An explanation of the underlying mechanisms

Sarmistha Saha
Gujarat University, India

Background: The prevalence and incidence of nephrolithiasis is reported to be increasing across the world and calcium oxalate is the predominant component of most stones.

Objectives: To evaluate the preventive effect of gallic acid and quercetin in ethylene glycol induced nephrolithiasis.

Material & Methods: Gallic acid and quercetin were studied using *in vitro* and *in vivo* methods. The results were also inspected using *in silico* molecular docking tool with the protein targets.

Results: An animal model of urolithiasis developed in male Wistar rats by adding 0.75% ethylene glycol in drinking water, gallic acid and quercetin prevented calcifications in the renal tubules. Ethylene glycol caused a significant increase in calcium, oxalate, phosphate, and total protein in urine as well as in kidney along with an impairment of renal function and polyuria. These changes were prevented in gallic acid and quercetin treated rats. MDCK renal epithelial cells were co-incubated with calcium oxalate monohydrate (COM) and both the phytochemicals. It was found that both the phytochemicals attenuated the apoptotic death induced by COM as measured in terms of cell viability, caspase-9/3 activities and DNA fragmentation percent. Both the phytochemicals also attenuated the increase in lipid peroxidation and glutathione depletion induced by COM crystals. The inhibitory role of both the phytochemicals on caspase-9/3 activities were also analyzed using molecular docking experiments, which showed interactions to their active sites.

Conclusions: In conclusion, the preventive effect of these phytochemicals was associated to the inhibition of oxidative stress and caspases.

Biography

Sarmistha Saha gained her Bachelor's degree in Zoology from Delhi University and Veer Narmad South Gujarat University and Master's degree in Biomedical Technology from Gujarat University in India. She then received her PhD in Life Science from the Gujarat University, India. She was employed with Pharmacology & Toxicology Department, B V Patel Pharmaceutical Education, Research and Development Centre. Her research focuses on pathophysiology induced by kidney stones and their modulation by medicinal plants and their chemical principles by *in silico, in vivo* and *in vitro* techniques. Development of phytochemical profile of medicinal plants by chromatographic techniques and computer aided drug designing are her other research interests.

saha30@live.com

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