



Ferrototoxicity and its amelioration by endogenous vitamin D in experimental acute kidney injury

Pragasam Viswanathan

VIT University, India

Abstract:

Introduction:

Acute kidney injury (AKI) causes significant morbidity and mortality. This experimental animal study investigated the simultaneous impact of iron and vitamin D on AKI induced by Iohexol, an iodinated, non-ionic monomeric radiocontrast agent in Wistar rats. Out of 36 healthy male Wistar rats, saline was injected into six control rats (group 1) and Iohexol into the remaining 30 experimental rats (groups 2 to 6 comprising six rats each). Biochemical, renal histological changes and gene expression of iron-regulating proteins and 1 α -hydroxylase were analyzed. Urinary neutrophil gelatinase-associated lipocalin (NGAL), serum creatinine, urine protein, serum and urine catalytic iron, 25-hydroxyvitamin D₃, 1,25-dihydroxyvitamin D₃ and tissue lipid peroxidation were assayed. Rats injected with iohexol showed elevated urinary NGAL (11.94 \pm 6.79 ng/mL), serum creatinine (2.92 \pm 0.91 mg/dL) and urinary protein levels (11.03 \pm 9.68 mg/mg creatinine) together with histological evidence of tubular injury and iron accumulation. Gene expression of iron-regulating proteins and 1 α -hydroxylase was altered. Serum and urine catalytic iron levels were elevated (0.57 \pm 0.17; 48.95 \pm 29.13 μ mol/L) compared to controls (0.49 \pm 0.04; 20.7 \pm 2.62 μ mol/L, p <0.001). Urine catalytic iron positively correlated with tissue peroxidation (r =0.469, CI 0.122 to 0.667, p =0.004) and urinary NGAL (r =0.788, CI 0.620 to 0.887, p <0.001). 25-hydroxyvitamin D₃ (61.58 \pm 9.60 ng/mL) and 1,25-dihydroxyvitamin D₃ (50.44 \pm 19.76 pg/mL) levels increased simultaneously. On a multivariate linear regression analysis, serum iron, urine catalytic iron and tissue lipid peroxidation independently and positively predicted urinary NGAL, an AKI biomarker. This study highlights the nephrotoxic potential of catalytic iron besides demonstrating a concurrent induction of vitamin D endogenously for possible renoprotection in AKI.

Biography:

Pragasam Viswanathan has completed his PhD at the age of 29 years from University of Madras, Dr. ALM PGIBMS and post-doctoral studies from Medical College of Wisconsin, Milwaukee, US. Currently he is the Professor and Dean for the School of Bio Sciences and Technology, VIT University, Vellore, Tamil Nadu, India. He has published more than 40 papers in reputed journals and has been serving as an editorial board member and Academic Editor of reputed



Publication of speakers:

1. Chandra Shakar A, Rajesh NG and Pragasaam V. Ferrototoxicity and its impact on endogenous vitamin D in experimental acute kidney injury. *Experimental Biology and Medicine*, Volume: 245 issue: 16, page(s): 1474-1489. <https://doi.org/10.1177/1535370220946271>.
2. Yuvashree M, Rajesh NG, Pragasaam V. Potential application of nanoemulsified garlic oil blend in mitigating the progression of type 2 diabetes mediated nephropathy in Wistar rats. *3 Biotech* 10, 272 (2020). <https://doi.org/10.1007/s13205-020-02262-w>
3. Venkateshan Jagannathan, Venkatesan Arthi and Pragasaam V. Eugenol and vanillic acid inhibit a potential enzyme of nosocomial pathogen *Proteus mirabilis* - kinetics and computational approach. *Current Enzyme Inhibition*. Volume 16, Issue 2, 2020, <https://doi.org/10.2174/1573408016999200415115754>
4. Yuvashree Muralidaran, Gokulakannan Ragavan, Rajesh NG, Pragasaam V. Enhanced therapeutic potency of nanoemulsified garlic oil towards renal abnormalities in pre-diabetic rats. *Appl Biochem Biotechnol*. 2019 Jun;188(2):338-356. doi: 10.1007/s12010-018-2919-8.
5. Kumar, S; C, P; Parameswaran, S.; Shewade, D.; Viswanathan, P; Ganesh, R. miR-148b Differentiates Tubular Atrophy/Interstitial Fibrosis Histopathological Stages in IgA Nephropathy. Preprints 2020, 2020060049 (doi: 10.20944/preprints202006.0049.v1).

[Webinar on Nephrology | November 05, 2020 | Dubai, UAE](#)

Citation: Pragasaam Viswanathan; Ferrototoxicity and its amelioration by endogenous vitamin D in experimental acute kidney injury; *Nephrology* 2020; November 05, 2020; Dubai, UAE