

Experimental evaluation of furosemide and/or tadalafil in conventional and nanoparticle forms in prevention of chronic renal failure induced in rats.

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Abstract

Introduction: Chronic renal failure (CRF) is a progressive loss of renal function that lead to reduced sodium filtration and inappropriate suppression of tubular reabsorption that ultimately leads to volume expansion. To improve treatment outcomes, the aim of this study was to evaluate the possible renoprotective effect of tadalafil and furosemide, individually and in combination, in both conventional and nanoforms in adenine-induced CRF rat-model. **Methods:** Addition of 0.75% adenine to the diet of rats for 4 weeks gained general acceptance as a model to study kidney damage as this intervention mimicked most of the structural and functional changes seen in human chronic kidney disease Urine analysis, histopathological changes and immunohistochemical expression of caspase-3 and interleukin-1 β (IL-1 β) in renal tissues were performed. **Results:** Our results showed that the combination of tadalafil and furosemide using conventional and nanoparticle formulations revealed a beneficial therapeutic effect in the treatment of CRF. This was demonstrated by improvement of urinary, serum and renal tissue markers as indicative of organ damage. This was also reflected on the reduction of tubular expression of KIM-1 and NGAL. Immunohistochemical studies showed that significant increase in the number of apoptotic tubular cells indicated by increased expression of caspase-3 in CRF. These deteriorated renal cellular changes were improved by the treatment of rats with the investigated drugs. Results from ELISA showed that IL-1 β was reduced by such treatment in kidney tissue. **Conclusion:** Tadalafil and furosemide improved the biochemical, histopathological and immunohistochemistry changes in adenine-induced CRF which strongly support the renopreventive effects of investigated drugs in particular the nanoparticle forms.

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