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Home
Current issue
Instructions
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Preconditioning with *Azadirachta indica* ameliorates cardiorenal dysfunction through reduction in oxidative stress and extracellular signal regulated protein kinase signalling

Temidayo Olutayo Omobowale,[a] Ademola Adetokunbo Oyagbemi,[b,*] Olumuyiwa Abiola Adejumobi,[a] Eguonor Vivian Orherhe,[a] Adetayo Sadudeen Amid,[c] Adeolu Alex Adedapo,[b] Helen Olubukola Nottidge,[a] and Momoh Audu Yakubu[d]

[a]Department of Veterinary Medicine, Faculty of Veterinary Medicine, University of Ibadan, Nigeria
[b]Departments of Veterinary Physiology, Biochemistry and Pharmacology, Faculty of Veterinary Medicine, University of Ibadan, Nigeria
[c]Department of Veterinary Surgery and Reproduction, Faculty of Veterinary Medicine, University of Ibadan, Nigeria
[d]Department of Environmental and Interdisciplinary Sciences, College of Science, Technology and Engineering, Texas Southern University, 3100 Cleburne Avenue, Houston, TX 77004, USA
Ademola Adetokunbo Oyagbemi: ademola.oyagbemi778@gmail.com
*Corresponding author.Departments of Veterinary Physiology, Biochemistry and PharmacologyFaculty of Veterinary MedicineUniversity of IbadanNigeria . Email: ademola.oyagbemi778@gmail.com

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Abstract

Background

Azadirachta indica is widely distributed in Africa, Asia and other tropical parts of the world. *A. indica* (AI) is traditionally used for the treatment of several conditions including cancer, hypertension, heart diseases and skin disorders. Intestinal ischaemia-reperfusion is a common pathway for many diseases and may lead to multiple organ dysfunction syndrome and death.

Objective

In this study, we investigated the ameliorative effects of AI on intestinal ischaemia-reperfusion injury-induced cardiorenal dysfunction.

Materials and methods

Sixty rats were divided into 6 groups; each containing 10. Corn oil was orally administered to group A (control) rats for 7 days without intestinal ischaemia-reperfusion injury. Group B underwent intestinal ischaemia-reperfusion injury (IIRI) without any pre-treatment. Groups C, D, E and F were pre-treated orally for 7 days with 100 mg/kg AI (100 and (200 mg/kg) vitamin C (100 and 200 mg/kg) respectively and thereafter underwent IIRI on the 8th day.

Results

The cardiac and renal hydrogen peroxide increased significantly whereas serum xanthine oxidase and myeloperoxidase levels were significantly elevated ($p < 0.05$) in IIRI only when compared to the control. The cardiac and renal reduced glutathione, glutathione peroxidase, protein thiol, non-protein thiol and serum nitric oxide (NO) decreased ($p < 0.05$) significantly following IIRI. Immunohistochemical evaluation of cardiac and renal tissues showed reduced expressions of the extracellular signal regulated kinase (ERK1/2) in rats with IIRI only. However, pre-treatment with *A. indica* and vitamin C significantly reduced markers of oxidative stress and inflammation together with improvement in antioxidant status. Also, reduced serum NO level was normalised in rats pre-treated with *A. indica* and vitamin C with