CO-ADMINISTRATION OF ANTIOXIDANT REDUCES OXIDATIVE DAMAGE ANTIBIOTIC-INDUCED IN MULTIPLE ORGANS DURING SEPSIS

Galvão, A.M.¹*, Silva, R.A.¹, Fernandes, J.G.C.¹, Wanderley, M.S.O.¹, Filho, C.A.M.¹, Melo-Junior, M.R.², Magalhães, N.S.S.³, Andrade, A.D.de.⁴, Leite, A.C.R.⁵, Maia, M.B.S.⁵, Bezerra, R.S.⁶, Castro, C.M.M.B.¹.

¹Department of Microbiology and Cell Culture, Laboratory of Immunopathology Keizo Asami, Recife (PE), Brazil; ²Department of Pathology, Federal University of Pernambuco, Recife (PE), Brazil; ³Department of Pharmacology, Federal University of Pernambuco, Recife (PE), Brazil; ⁴Department of Physiotherapy, Federal University of Pernambuco, Recife (PE), Brazil; ⁵Department of Pharmacology and Physiology, Federal University of Pernambuco, Recife (PE), Brazil; ⁶Department of Biochemistry, Federal University of Pernambuco, Corresponding author: andremgalvao@hotmail.com

INTRODUCTION: Recent studies have revealed that bacterial infection and antibiotic therapy are associated with intense inflammation and also linked to the formation of reactive oxygen species which contribute to the misfolding of proteins, genes mutations, instability between iron-sulfur and depletion of NADH. OBJECTIVE: Thus, the aim of this study was evaluate the co-adjuvant effect of antioxidants in the liver, kidney and spleen injuries ceftriaxone-induced during sepsis. METHODS: For this purpose the sepsis was induced by cecal ligation and perforation or sham-operated. The animals were treated with ceftriaxone or ceftriaxone plus antioxidants. The main antioxidant enzymes, superoxide dismutase (SOD) and catalase were measured, as well as protein carbonyls, sulphhydril groups, thiobarbituric acid reactive species and superoxide anion, as an index of oxidative damage. RESULTS: Twelve hours after sepsis induction, we observed an increase in the oxidative damage in all of the organs studied. In addition, the ceftriaxone increased the levels of superoxide anion, malonaldehyde equivalents, protein carbonyls, SOD and catalase activities and decreased the sulphhydril groups. On the other hand, the antioxidants supplementation was able to decrease the oxidative stress ceftriaxone-induced, including histological alterations and increased the survival rate. CONCLUSION: the current study showed that ceftriaxone act as a pro-oxidant agent and induced a different profile of oxidative damage in the liver, kidney and spleen of the rats. In addition, the co-administration of antioxidant was able to reduce the oxidative injury in these organs. Wherefore, our data support the idea of prophylactic and therapeutic strategies to improve antioxidant status as co-adjuvants in sepsis.

Keywords: ceftriaxone; oxidative stress; vitamin C, NAC, vitamin E; multiple organ injury; sepsis.

Grants: Brazilian Ministry of Science and Technology - Brazilian Research Council (CNPq), Brazilian Ministry of Education - CAPES and Research Foundation at the Pernambuco State (FACEPE). Institution where this work was done: Laboratory of Immunopathology Keizo Asami (LIKA) at University Federal of Pernambuco, Brazil.