Research in Pharmaceutical Sciences, 2012;7(5)
School of Pharmacy and Pharmaceutical Sciences
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Evaluation of erythropoietin effect on cellular neurotoxicity after carbon monoxide poisoning in rat

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Background and Aims: Carbon monoxide (CO) poisoning clearly has mechanisms of toxicity beyond the formation of CO-Hemoglobin. Soluble CO in the plasma causes a cascade of events which leads to lymphocytic immunologic response and finally neurologic defects. Erythropoietin (EPO) has a critical role in the development and repair of the nervous system. In this study the effect of EPO in the managment of CO toxicity and the possible mechanisms were examined.
Methods: First the rats were exposed to 3000 PPM CO in air for 1 hour. Then EPO (2500, 5000 and 10000 u/kg) were administrated intraperitoneally (IP). After 24 hours Myelin Basic Protein (MBP) levels in the serum were determined by ELISA. The effect of EPO on brain lipid peroxidation was determined by measuring malondialydehyde (MDA) using a colorimetric method. The hemoglobin count was determined too. Also the myeloperoxidase (MPO) activity in the brain tissue was evaluated. To evaluate the possible behavioral abnormalities as a result of CO poisoning Morris water maze study and neurological scoring were performed. We did western blotting for determination of caspase3, BAX and BcL2 relative expression.
Results: The MDA levels were reduced by EPO ($p<0.05$ as compared to CO poisoned animals). The serum level of MBP was not altered significantly after CO exposure. In this model of poisoning there were no behavioral abnormalities in learning and memory as shown in the Morris water maze study. Also, neurological scoring did not reveal any abnormalities after poisoning. The MPO activity in the brain tissue was reduced by EPO significantly. EPO could significantly increase the hemoglobin count. Western blotting shows that the apoptosis has occurred but the extrinsic pathway did not have an important role in this process ($P<0.05$).
Conclusions: EPO has a potential role to manage CO poisoning.

Keywords: Carbon monoxide poisoning; Erythropoietin; Myelin Basic Protein; Cellular neurotoxicity