ORIGINAL ARTICLE

Histological and Anti-oxidative Effects of Eugenol on Aluminium Chloride-Induced Neurotoxicity in Wistar Rats


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ABSTRACT

Accumulation of aluminium chloride results in damage to different brain regions, and has been used to model damage to the hippocampus which can be associated with various neurodegenerative diseases such as Alzheimer’s and Parkinson’s. The aim of this study was to assess the protective effects of eugenol on aluminium induced neurotoxicity in the hippocampus of adult Wistar rats. 30 adult Wistar rats were procured and divided into six groups with five animals in each group, namely: EGH (300 mg/kg eugenol), EGL (150 mg/kg eugenol), EGH+AL (300 mg/kg eugenol and 100 mg/kg AlCl₃), EGL+AL (150 mg/kg eugenol and 100 mg/kg AlCl₃), AL (100 mg/kg AlCl₃) and CTRL (2 mL/kg distilled water). All Groups were treated orally for 21 days after which they were humanely sacrificed under 0.8 mL/kg ketamine as an anaesthetizing agent. Thereafter, brain tissues were removed and processed for histological demonstration, while the frontal lobe was homogenized and the resultant homogenate obtained was used to assay the levels of superoxide dismutase (SOD) activity. Rat body weights were measured before and after treatment. Aluminium resulted in a significant (p<0.05) reduction in SOD activities. There was alteration in the histology of hippocampal neurons (CA1) and a significant (p<0.01) reduction in body weight of animals. However, the administration of Eugenol was able to restore the activity of SOD. The use of Eugenol offers a promising prospect in the management of neurodegenerative diseases associated with aluminium toxicity.

Key words: Aluminium chloride, Eugenol, Neurotoxicity, Cytoarchitecture, Superoxide dismutase, Hippocampus

INTRODUCTION

Aluminium is extremely reactive with carbon and oxygen, two of the leading elements of life on earth. For this reason, the widespread use of bioavailable aluminium may have immense and far reaching implications for the health of humans and animals. In fact, much evidence shows that aluminium seems to be toxic to all forms of life on earth, and where it appears in terrestrial biochemistry, it is invariably deleterious (Inan-Eroglu and Ayaz 2018).

Aluminium currently finds its way into virtually every aspect of our daily lives, where it is used in cans, cookware, aluminium foil, housing materials, and components of electrical devices, airplanes, boats, cars and numerous hardware items of all descriptions (Carson 2000; Hirata-Koizumi et al. 2011).

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