OMICS Group Conferences
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International Conference and Exhibition on
Neurology & Therapeutics

May 14-16, 2012 Embassy Suites Las Vegas, USA

Progressive neurodegenerative shielding of Curcumin, De-methoxycurcumin & Bis-demethoxycurcumin on nigrostriatal terminal lesion model of Parkinson's disease in Albino Wistar rats: A comparative approach

Sumeet Gullaiya, Shyam Sunder Agrawal, Vishal Dubey and Varun Singh

Delhi Institute of Pharmaceutical Sciences and Research (DIPSAR), India

Aim: Study was undertaken to evaluate and compare the neurodegenerative defending potential of Curcumin, De-methoxycurcumin & Bis-demethoxycurcumin on 6-hydroxy dopamine induced animal Parkinsonism model.

Material and Method: Isolated curcuminoids were administered (30 mg/kg) for three weeks followed by unilateral injection of 6-hydroxydopamine on 22nd day (10µg/2µl) into the right striatum leading to extensive loss of dopaminergic cells. The behavioral observations (apomorphine induced rotations, motor coordination & locomotor activity), biochemical markers (Malondialdehyde, Glutathione, Glutathione reductase, Glutathione peroxidase, Superoxide dismutase & Catalase), Dopamine D_2 receptor binding assay and tyrosine hydroxylase immunohistochemistry were evaluated after three weeks of leison.

Results & Discussion: 6- hydroxydopamine induced neurodegeneration is associated with an antioxidant deficit and deranged levels of biochemical markers. The increase in apomorphine-induced rotations and deficits in locomotor activity & muscular coordination due to 6- hydroxydopamine injection were significantly restored in curcuminoids pretreated groups with Curcumin showing maximal recuing effect as compared to protective effects of De-methoxycurcumin and Bis-demethoxycurcumin. Pretreated animals showed significant protection against neuronal degeneration compared to leison animals by normalizing the deranged levels of biomarkers and showed the effectivity in the order Curcumin > De-methoxycurcumin ≥ Bis-demethoxycurcumin. The same order of potency was observed in D_2 receptors binding assay and tyrosine hydroxylase immunohistochemistry study. Curcuminoids appears to shield progressive neuronal degeneration from increased oxidative attack in 6-OHDA lesioned rats through its free radical scavenging, MAO-B inhibiting and DA enhancing capabilities in the sequence of efficacy; Curcmin > De-methoxycurcumin > Bis-demethoxycurcumin. Further, curcuminoids may have potential utility in treatment of many more oxidative stress induced neurodegenerative disorders.

sumeetstar@gmail.com