Antioxidant defense mechanism of sesamol and attenuation of bleomycin induced pulmonary toxicity in experimental animals

Swati Kaushik¹, Ameesha Tomar¹, Jagriti Bhatia¹, Dharamvir Singh Arya¹, Sudheer Arava²

¹*Deptment of Pharmacology, All India Institute of Medical Sciences, New Delhi, India,* ²*Department of Pathology, All India Institute of Medical Sciences, New Delhi-110029, India*

Objective:

Pulmonary diseases are of utmost concern now-a-days with increasing environmental pollution. Idiopathic pulmonary fibrosis (IPF) is one of the most common among ILDs. It is mainly caused due to environmental pollution, radiations, chemotherapy and other chronic inflammatory diseases. Bleomycin is an anti-cancer drug used for treatment of various cancers. Major adverse effect of this drug is pulmonary toxicity leading to irreversible lung fibrosis and ultimately death as no proper treatment regimen is present till date. Phytochemical agents are devoid of the harmful effects shown by the allopathic drugs. So, use of bioflavonoids is increasing as alternative treatment measure against pulmonary toxicity and fibrosis.

Aim of the present study is to evaluate the effect of bio-flavonoid sesamol against bleomycin induced pulmonary toxicity in rats.

Methodology:

Rats (male, wistar) were pre-treated with sesamol (p.o./day) in different doses starting one week prior to the 1st dose of bleomycin (0.03U/g of rat; twice weekly; i.p.) and treatment was continued for 35 days along with bleomycin twice weekly dose.

Parameters evaluated at the end of the study included hydroxyproline content, biochemical parameters (MDA, GSH, SOD and Catalase), inflammatory markers (TNF-alpha, IL-6) and fibrotic markers (TGF-beta, collagen I). Hematoxylin-eosin staining and electron microscopy was performed to detect pulmonary toxicity. Western blotting analysis was also analysed to delineate the protein expression in different samples.

Results:

The levels of TNF-alpha, IL-6 and MDA were found to be elevated. Hydroxyproline content was also found to be raised in case of bleomycin treated group of rats. Whereas, the value of GPx and SOD was significantly decreased in bleomycin group. Sesamol (50mg/kg) treatment significantly decreased TNF-alpha, IL-6, MDA levels and hydroxyproline content whereas GPx and SOD activities were significantly increased. Histopathological, EM and western blot analysis supported the results.

Conclusion: Sesamol was found to be having potential role in reduction of the toxic effects of bleomycin and it may provide supportive/alternative therapy for conventional treatment methods against idiopathic pulmonary toxicity in experimental animals.