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# Mitigation of Lung Toxicity Induced by B(a)P Via Modulation of Oxidative Stress and Inflammation by Carvacrol in Mice

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**Abstract**

**Introduction:** *Benzo(a)pyrene [B(a)P], an environmental pollutant, causes various lung toxicities. The present study was conducted to evaluate the protective effects of carvacrol against B(a)P induced lung toxicity.*

*Method: Swiss albino mice were divided into 5 groups(n=6 each) as follows: Group I:Corn oil control, Group II: single dose of B(a)P (125 mg/kg, p.o.), Group III: carvacrol(25 mg/kg, p.o.) for 7 days + single dose of B(a)P (125 mg/kg, p.o.) on 7$^{th}$ day, Group IV: carvacrol(50 mg/kg, p.o.) for 7 days + single dose of B(a)P (125 mg/kg, p.o.) on 7$^{th}$ day, Group V: carvacrol(50 mg/kg, p.o.) for 7 days. All the animals were sacrificed on the 8$^{th}$ day. Blood and lung tissues were collected for biochemical parameters (serum and post mitochondrial supernatant), and histopathological and immunohistochemical analysis of inflammatory (NF-kB, iNOX, COX-2) markers.*

*Results: There was a significant difference ($p<0.001$) in the activity of different antioxidant enzymes between Group I and II. Carvacrol (25 mg/kg) significantly increased the activities of GPx ($p<0.01$), GR ($p<0.01$), GST ($p<0.001$) in Group III animals as compared to Group II ones; and at higher dose (Group III), carvacrol was found to be more effective. B(a)P increased the level of malondialdehyde ($p<0.001$) and xanthine oxidase activity ($p<0.001$), which were significantly restored by carvacrol pre-treatment in a dose dependent manner. B(a)P administration caused disruptions of epithelium, destruction of alveolar architecture and necrosis of the alveolar epithelium as compared to the control animals. Carvacrol was found to be protective in terms of such histological changes. Immunohistochemical examination revealed that B(a)P administration upregulated the expression of protein like iNOS, NF-kB and COX-2 in the lung tissue. Carvacrol pretreatment however downregulated their expressions. No toxic features were observed in the Group V animals.*

*Conclusion: Our results suggest that carvacrol is safe and protective against B(a)P-induced lung toxicity by preventing oxidative stress, apoptosis and inflammation.*

**Keywords***: Benzo(a)pyrene [B(a)P], environmental pollutant, lung toxicities, carvacrol.*