Ethanolic Extract of Marsdenia condurango Ameliorates Benzo[a]pyrene-induced Lung Cancer of Rats

Sourav Sikdar, Avinaba Mukherjee, Anisur Rahman Khuda-Bukhsh*

Cytogenetics and Molecular Biology Laboratory, Department of Zoology, University of Kalyani, Kalyani, India

Key Words
apoptosis, caspase-3, complementary and alternative medicine (CAM), Condurango, lung cancer, reactive oxygen species (ROS)

Abstract
Objectives: Condurango is widely used in various systems of complementary and alternative medicine (CAM) against oesophageal and stomach ailments including certain types of cancer. However, until now no systematic study has been conducted to verify its efficacy and dose with proper experimental support. Therefore, we examined if ethanolic extract of Condurango could ameliorate benzo[a]pyrene (BaP)-induced lung cancer in rats in vivo to validate its use as a traditional medicine.

Methods: After one month of scheduled BaP feeding (50 mg/kg body-weight), lung cancer developed after four months. BaP-intoxicated rats were then treated with Condurango (0.06 mL) twice daily starting at the end of the four months for an additional one, two and three months, respectively. Effects of Condurango were evaluated by analyzing lung histology, reactive oxygen species (ROS) and antioxidant biomarkers, DNA-fragmentation, RT-PCR (Reverse Transcriptase-Polymerase Chain Reaction), ELISA (Enzyme linked immunosorbent assay) and western blot of several apoptotic signalling markers and comparing the results against those obtained for controls.

Results: A histological study revealed gradual progress in lung tissue-repair activity in Condurango-fed cancer-bearing rats, showing gradual tissue recovery after...
three months of drug administration. Condurango has the
capacity to generate ROS, which may contribute to a reduc-
tion in anti-oxidative activity and to an induction of oxida-
tive stress-mediated cancer-cell death. Condurango-acti-
vated pro-apoptotic genes (Bax, caspase-3, caspase-9, p53, 
cytochrome-c, apaf-1, ICAD and PARP) and down-regu-
lated antiapoptotic-Bcl-2 expression were noted both at 
mRNA and protein levels. Studies on caspase-3 activation 
and PARP cleavage by western blot analysis revealed that 
Condurango induced apoptosis through a caspase-3-de-
pendent pathway.

**Conclusions:** The anticancer efficacy of an ethanolic ex-
tract of Condurango for treating BaP-induced lung cancer 
in rats lends support for its use in various traditional sys-
tems of medicine.

We apologize to the authors and readers.