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Research Article

Ameliorative Role of Mixed Hydro-methanolic (60:40) Extract of *Andrographis paniculata* on Chromium (VI)-induced Immunomodulation in Male Albino Rats

Sankar K. Dey^{1*}, Durgapada Dolai²¹Department of Physiology, Santal Bidroha Sardha Satabarshiki Mahavidyalaya (Affiliated to Vidyasagar University), West Midnapore, West Bengal, India.²Department of Physiology, Midnapore Medical College & Hospital, West Midnapore, West Bengal, India.

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ABSTRACT

The immune system controls the body's homeostatic state and helps to defend against infections. Activation and expansion of many biomolecules are crucial for the homeostatic state. Chromium, a common heavy metal found in nature, is active in its hexavalent state. The abundant use of chromium in paints, steel plants, intoxicated the workers and modulates their body homeostasis. In this article, we were intended to evaluate the role of *Andrographis paniculata* Nees extract on restoration of the body homeostatic state in terms of immune system. For the present investigation, a group of male albino rats (80–100 g) were induced by intraperitoneal injection of vehicle (0.9% NaCl), Potassium dichromate ($K_2Cr_2O_7$) (0.8 mg / 100 g body weight / day), $K_2Cr_2O_7$, plus mixed hydro-methanol solvent extract in the ratio of 60:40 at a dose of 500 mg/kg body weight daily at an interval of six hours after injection of $K_2Cr_2O_7$ for a period of 28 days. We found that Cr (VI) induces a hyper response of pro-inflammatory cytokines followed by apoptosis in liver and lung tissue. Excess production of reactive oxygen species (ROS) is controlling the whole phenomena. The *A. paniculata* Nees extract successively inhibit the ROS generation, as a result a significant quenching of pro-inflammatory cytokine production was noted. *A. paniculata* Nees extract prompted decrease amount of ROS and its associated inflammation provoke the cell survival and helps to maintain a homeostatic state of the body.

INTRODUCTION

High doses and long term exposure of chromium can increase cytotoxic and genotoxic reactions, affecting the body immune system. Till now it is not understood the mechanism of Cr (VI)-exposed cytotoxicity. However, *in vitro* and *in vivo* studies have noted that Cr (VI)-exposed oxidative stress through increased ROS production and genomic DNA fragmentation, modulation of intracellular oxidized states, activation of protein kinase C, apoptotic cell death and altered gene expression.^[1] Apoptotic cell death has been observed in numerous skin inflammatory diseases. In addition, there is a direct link among autophagy, cell death, antigen processing, and the generation of inflammatory and immune responses.^[2] During these

processes, ROS-regulated redox-sensitive protein kinases and transcription factors (for example, Nuclear factor κB (NF- κB), Mitogen-activated protein kinase (MAPK) and Akt pathway) can affect the cytokines release, such as tumor necrosis factor (TNF- α) and interleukin-1 (IL-1).^[3]

A. paniculata is an Indian traditional system used as a medicine for various diseases. There are more than 20 different active bio constituents like flavonoids, phenols, alkaloid, glycosides, saponins and tannins are present in the *A. paniculata*. The *A. paniculata* extract also exhibits good anti-cancer, anti-bacterial and anti-fungal activities.^[4] *A. paniculata* extracts contain the principal compound andrographolide. Methanol extract of this plant was more active in antioxidant activities.^[5]

*Corresponding Author: Sankar K. Dey

Address: Department of Physiology, Santal Bidroha Sardha Satabarshiki Mahavidyalaya (Affiliated to Vidyasagar University), West Midnapore, West Bengal, India.

Email ✉: sdeybiomed@gmail.com

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Aphadikar
Principal
S.B.S.S. Mahavidyalaya, Goaltore
Paschim Medinipur, Pin-721128