

News & Comments

A. paniculata* is a Cardioprotective AgentJenson Easo*

Doxorubicin belongs to the anthracycline antibiotic family, which is well-known for its anti-cancer properties. It works against a wide spectrum of malignancies, including solid tumours and leukemias. The medication forms significant intercalation with DNA, causing DNA strand breakage.

Doxorubicin also inhibits topoisomerase II, causing DNA damage and death in the cells. Despite its positive results, the drug's clinical use is restricted due to its negative side effects. The toxicity caused by doxorubicin can be explained by several processes. Some of the mechanisms of Doxorubicin-induced cardiomyopathy include impaired calcium signalling, altered iron signalling, decreased heart repair, promotion of apoptosis, and oxidative stress.

Andrographis paniculata is one of the plants having rich bioactive components. The plant extract has been demonstrated to process antidiabetic, anti-inflammatory, analgesic, anti-viral and cardioprotective effects. Therefore, this study attempted to evaluate the preventive impact of *A. paniculata* on doxorubicin induced cardiotoxicity. Zebrafish was used as a model system to evaluate the effect of the extract on auditory toxicity produced by doxorubicin.

The study was carried out at the Department of Cardiology, Qingdao Municipal Hospital, China. A total of 72 fishes were employed for the research. Zebrafish (*Danio rerio*) were obtained at the aquarium. The zebrafish is a robust fish and can endure a pH ranging between 7.2 and 7.5. The temperature of the water was maintained at $26 \pm 1^\circ\text{C}$ throughout the investigation. During the acclimation period, the adult fish was fed twice per day with readily accessible commercial fish food. A total of 10 g of the plant powder (*A. paniculate*) was dissolved in 10 mL of Sterile Milli sQ water, and heated in the water bath at 100°C for 1 h. To optimize the concentration of extract of *A. paniculate* $2-10 \mu\text{g mL}^{-1}$ and then $10-50 \mu\text{g mL}^{-1}$ was supplied. Catalase activity was tested using the method. The tissues were ground using liquid nitrogen.

Doxorubicin has been shown to generate significant oxidative stress in cardiac tissue. As a result, the activity of the catalase enzyme after treatment with *A. paniculata* was measured. The enzyme's activity was lowered by doxorubicin treatment. Surprisingly, detected a dose-dependent increase in catalase enzyme activity. GSH levels were dramatically increased by *A. paniculata* extracts, just like catalase activity. Nitric oxide levels were significantly reduced in the treatment with *A. paniculata* extract. The activity of superoxide dismutase, an enzyme involved in the neutralization of oxidative stress, was measured. Lactate dehydrogenase is an enzyme found in all cells of all species. It is employed as a



biomarker for tissue injury since it is released from tissues when they are injured.

Another biomarker of tissue injury is creatinine kinase. To test the preventive activity of *A. paniculata* extract, we measured creatinine kinase activity. The total protein content of each group was calculated. Surprisingly, there was an increasing trend in total protein content after treatment with *A. paniculata* extract. The control group's cardiac tissue had normal architecture, with no necrosis, oedema, or inflammation. *A. paniculata* has potent cardioprotective properties. This study looked how an extract of *A. paniculata* reduced the cardiotoxicity produced by the medication. In this work, zebrafish served as the model organism. Reactive oxygen species are a substantial factor in doxorubicin-induced cardiotoxicity. Doxorubicin-mediated reactive oxygen species build-up could be the cause of a variety of side effects.

According to the findings, doxorubicin-induced cardiotoxicity can be reversed by supplementing with *A. paniculata* extract. By activating enzymes such as SOD, the extract significantly decreases oxidative stress. The extract also lowers doxorubicin-induced cellular damage, as measured by LDH release and CK activity. The histopathology analysis also demonstrates that the extract-induced tissue damage can be repaired. Doxorubicin, despite being an effective anti-cancer medicine, induces life-threatening cardiomyopathy, limiting its clinical utility. Doxorubicin-induced ROS is a major factor in the drug's side effects.

JOURNAL REFERENCE

Wang, H., X. Yu, Z. Xun and Y. Wu, 2022. Aqueous extract of *Andrographis paniculata* ameliorates cardiotoxicity induced by doxorubicin in vivo. *Int. J. Pharmacol.*, 17: 466-474.

KEYWORDS

Zebrafish, doxorubicin, cardiomyopathy *Andrographis paniculata*, ROS, SOD, GSH

