

Biotechnology, Biomarkers & Systems Biology 2019: Amelioration of CCl₄ induced liver injury in swiss albino mice by antioxidant rich leaf extract of *Croton bonplandianus* Baill- Somit Dutta- University of North Bengal, India

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The progress in industrialization has blessed mankind with a technologically superior lifestyle but poor management of industrial unused has in turn poisoned nature. One such chemical is carbon tetra chloride (CCl₄), which is a potent environmental toxin emitted from chemical industries and its presence in the atmosphere is increasing at an alarming rate. Presence of CCl₄ in human body is reported to cause liver hurt through free radical mediated inflammatory processes. Kupffer cells present in the liver are potentially more sensitive to oxidative stress than hepatocytes. Kuffer cells produced tumor necrosis factor- α (TNF- α) in response to reactive oxygen species (ROS), that might further cause inflammation or apoptosis. In this study hepatoprotective capacity of antioxidant rich extract of *Croton bonplandianus* Baill. (CBL) was evaluated on CCl₄ induced acute hepatotoxicity in murine model. Hydro-methanolic extract of *C. bonplandianus* leaf was used for evaluation of free radical scavenging activity. Liver cells of experimental mice were damaged using CCl₄ and subsequently hepatoprotective potential of the plant extract was evaluated using series of in-vivo and in-vitro studies. In the hepatoprotective study, silymarin was used as a positive control. Antioxidant enzymes, pro-inflammatory markers, liver enzymatic and biochemical parameters were studied to evaluate hepatoprotective activity of *Croton bonplandianus* leaf extract. Free radical scavenging activity of CBL extract was also observed in WRL-68 cell line. The phytochemicals identified by GCMS analysis were scrutinized using in-silico molecular docking procedure. The results showed that CBL extract have potent free radical scavenging capacity. The biochemical parameters were over expressed due to CCl₄ administration, which were significantly normalized by CBL extract treatment. This finding was also supported by histopathological evidences showing less hepatocellular necrosis, inflammation and fibrosis in CBL and silymarin treated group, compared to CCl₄ group. ROS generated due to H₂O₂ in WRL-68 cell line were normalize in the highest group (200 μ g/ml) when compared with control and negative control (CCl₄) group. After molecular docking analysis, it was observed that the compound α -amyrin present in the leaf extract of *C. bonplandianus* has better potentiality to protect hepatocellular damages than the standard drug Silymarin. The present study provided supportive evidence that CBL extract possesses potent hepatoprotective capacity by ameliorating haloalkane induced liver injury in the murine model. The antioxidant and anti-inflammatory activities also affirm the same. The synergistic effects of the

phytochemicals present in CBL are to be credited for all the hepatoprotective activity claimed above.

Antioxidants are substances that can prevent or slow damage to cells caused by free radicals, unstable molecules that the body produces as a reaction to environmental and other pressures. They are sometimes called "free-radical scavengers." The sources of antioxidants can be natural or artificial. Certain plant-based foods are thought to be rich in antioxidants. Plant-based antioxidants are a kind of phytonutrient, or plant-based nutrient. The body also produces some antioxidants, known as endogenous antioxidants. Antioxidants that come from outside the body are called exogenous.

Free radicals are waste substances produced by cells as the body processes food and reacts to the environment. If the body cannot process and remove free radicals efficiently, oxidative stress can result. This can harm cells and body function. Free radicals are also known as reactive oxygen species (ROS). Factors that increase the production of free radicals in the body can be internal, such as inflammation, or external, for example, pollution, UV exposure, and cigarette smoke. Oxidative stress has been linked to heart disease, cancer, arthritis, stroke, respiratory diseases, immune deficiency, emphysema, Parkinson's disease, and other inflammatory or ischemic conditions. Antioxidants are said to help neutralize free radicals in our bodies, and this is thought to boost overall health.