

## Antioxidant and radioprotective effect of an Indian medicinal plant

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Higher doses of ionizing radiations may lead to undesirable consequences. Hence natural products capable of preventing such damage have potential applications as radioprotectors. The radiations mediate their biological effects mainly through generation of short-lived chemical species called free radicals. Such free radicals are also generated in excess in our body during many adverse conditions like air pollutants, chemical toxicants, extreme climates and pathogens. Antioxidants, capable of neutralizing damage caused by free radicals have applications in the prevention and/or therapy of these diseases as well as in radioprotection. Consequently a search is on for novel natural products capable of protecting against radiation and free radicals, due to their low toxicity, as compared to synthetic compounds, and for their potential applications. Indian medicinal plants provide a potential reservoir for this purpose.

A number of such plants have been investigated for their beneficial effects and among them *Terminalia arjuna* shows good promise. *T. arjuna* (commonly known as kahu, arjuna or maruthu) is a large and dense tree attaining a height of around 25 m. For many years, the bark of *T. arjuna* has been used as a cardiac stimulator and tonic in India. It strengthens the heart

muscles and improves the blood-pumping capacity. It has been found to be extremely helpful in controlling stress and in early stages of coronary artery disease. The Indian 'Arjuna' is being considered as an answer to the Chinese wonder drug 'ginseng', which is among the world's largest selling herbal products.

In an effort to locate effective



*Bark and a branch of Terminalia arjuna*

antioxidants and radioprotectors, the extracts of the Arjuna bark and an active ingredient, baicalein, were studied for their properties. The studies revealed the antioxidant and radioprotective effects of various components from the bark of Arjuna even at very low concentrations. For instance the extracts of *T. arjuna* bark and baicalein shows high capacity to inhibit membrane damage induced by a biologically important free radical, superoxide. Interestingly, using an isolated inverted intestinal loop model, it was found that the Arjuna extracts and baicalein were significantly absorbed in the small intestine in rats.

The antioxidant effects are consistent at all levels of protection like prevention, radical scavenging and repair. Radioprotective effects were observed with different model systems against gamma radiation. These beneficial effects were found to be higher than those offered by natural components from other medicinal plants and dietary substances as well as standard antioxidants. The mechanisms behind these beneficial effects have also been elucidated and these relate to high ability to react with and neutralize the free radicals and related species of biological importance such as superoxide, hydroxyl radical, singlet oxygen, thiyl radical and peroxy radicals derived from various sources. Related reports from other Indian laboratories have substantiated the cardioprotective and stress-inhibiting effect of Arjuna bark. The present studies demonstrated its potent antioxidant and radioprotective effect.