

REVIEW PAPER

A Review on Anticancerous Activity of *Ficus religiosa* and *Andrographis paniculata*

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ABSTRACT

Cancer is now a days a most threatening disease. The allopathic drugs of it shows toxicity while herbal drugs are easily available, cheaper and has no side effects. Some common plants are always there in our environment which posses important medicinal properties but still these properties are not known well due to lack of research work among these plants two are *Ficus religiosa* and *Andrographis paniculata*. The antioxidants present in these plants not only make them resist to disease like cancer but also promote host resistance against other infection. When we use these plants in common routine they promote our immunity against the cancer as a result the chances of suffering from cancer can be reduced as remarkable level due to the phytochemicals present with them which are antioxidant in nature. *Andrographis paniculata* contains number of such compounds namely andrographolide (AG), neoandrographolide (NAG), and 14-deoxy-11,12-didehydroandrographolide (DDAG) while ethanolic leaf extract of *Ficus religiosa* shows anti-ulcer (ulcer-preventive) and acute toxicological effects. The main aim of this work to reveal the activity of *Ficus religiosa* and *Andrographis paniculata* which can play important role as anticancerous agents due to the presence of antioxidant phytochemicals.

Key words *Antioxidants, phytochemicals, Andrographis paniculata, Ficus religiosa, Andrographolide (AG), Neoandrographolide (NAG), and 14-deoxy-11,12-didehydroandrographolide (DDAG).*

India is the largest producer of medicinal plants and is rightly called the “Botanical garden of the World”. Considerable works have been done on these plants to treat cancer, and some plant products have been marketed as anticancer drugs, based on the traditional uses and scientific reports.

These plants may promote host resistance against infection by re-stabilizing body equilibrium and conditioning the body tissues. Preparation of standardized dose and dosage regimen may play a critical role in the remedy of cancer. (Umadevi *et al.*, 2013). According to the World Health Organization (WHO), about three quarters of the world’s population currently use herbs and other forms of traditional medicines to treat diseases. Traditional medicines are widely used in India. It has been also reported that more than 50% of all modern drugs in clinical use are of natural products, many of which have been recognized to have the ability to include apoptosis in various cancer cells of human origin. (Pandey and Madhuri., 2009).

Andrographis paniculata is a well-known traditional medicinal plant species with a bright economic horizon belonging to the Acanthaceae family. Andrographolides, the diterpene lactones, are major bioactive phytochemicals which could be found in different parts of the medicinal herb *Andrographis paniculata* (AP). A number of such compounds namely andrographolide (AG), neoandrographolide (NAG), and 14-deoxy-11,12-didehydroandrographolide (DDAG) have already attracted a great deal of attention due to their potential therapeutic effects in hard-to-treat diseases such as cancers and HIV. (Valdiani *et al.*, 2014). Oral administration of the aqueous extract of *A. paniculata* in different doses causes a significant elevation of catalase, superoxide dismutase and glutathione S transferase activities. It reveals the antioxidant action of the aqueous extract of AP, which may play a role in the anticarcinogenic activity by reducing the oxidative stress. (Verma and Vinayak., 2008). Environmental conditions such as salinity is a major abiotic stress that causes important alterations in the plant growth and development. It may lead to the accumulation

or reduction of certain metabolites. Under salinity stress, the tolerant accessions of *AP* were capable of accumulating the higher amounts of proline, AG, and NAG than the sensitive accessions. (Talei *et al.*, 2013). Another plant such as *Ficus religiosa* (*F. religiosa*) is an important traditional medicinal plant distributed throughout India, mostly near to the Indian temple for the spirituality. Bark of the plant is used as gonorrhoea, diarrhea, dysentery, leucorrhoea, menorrhagia, vaginal and other urogenital disorders haemorrhoids, ulcers and gastrohelcosis. It is also useful in inflammation, burning sensation, anti-bacterial, analgesic, anti-diabetic and anti-oxidant and its ethanolic leaf extract shows anti-ulcer (ulcer-preventive) and acute toxicological effects. (Gregory *et al.*, 2013). In a research work blood and liver tissues were collected subsequent to dissection and subjected to hematological, biochemical and anticancer assays treating with *F. religiosa* derived AgNPs. Antioxidant activity results further proved supportive evidence for antitumor activity of biosynthesized silver nanoparticles using *Ficus religiosa*. (Antony *et al.*, 2013).

Plants having anticancerous activity

Ficus religiosa

leaf extract was chosen as a reducing agent to fabricate silver nanoparticles (AgNPs) by a simple, cost-effective and eco-friendly process with the aim of treating Dalton's ascites lymphoma (DAL) in mice model. The apoptosis inducing effect of AgNPs was observed through acridine orange staining (AO and EB) and DNA fragmentation assay. All these observations indicate that the AgNPs were effective in treatment of DAL. (Antony *et al.*, 2013).

Ficus religiosa leaf ethanolic extract prevented ulcer area and gastric secretion in a dose-dependent manner. Preliminary phytochemical analysis identified the presence of flavonoids in the ethanolic extract of *F. religiosa* so concluded that the anti-ulcer activity is probably due to the presence of flavanoids. (Gregory *et al.*, 2013).

Tephrosia purpurea and *Ficus religiosa* showed anticancer potential in MCF 7 cell line. (Gulecha and Sivakuma 2011).

Treatment with vitamin E, sulphoraphane, and *Ficus religiosa* were found to be effective in

reversing Cd induced toxicity, representing potential therapeutic options to protect the reproductive tissues from the detrimental effects of Cd toxicity. (Jahan *et al.*, 2014).

Andrographis paniculata

Andrographolide isolated from *Andrographis paniculata* exhibited both direct and indirect effects on cancer cells by inhibiting proliferation of cancer cells, cell-cycle. Dichloromethane fraction of methanol extract significantly inhibited the proliferation of HT-29 colon cancer cells. (Hossain *et al.*, 2014).

Indian Council of Agricultural Research, Gujarat worked on extraction of three bioactive diterpenoids from *Andrographis paniculata*. According to them Diterpenoid compounds andrographolides are the main bioactive phytochemicals present in leaves and herbage of *A. paniculata*. (Kumar *et al.*, 2014).

Banaras Hindu University, Varanasi, studied antioxidant action of *Andrographis paniculata* (AP) on lymphoma. Their study revealed the fact that oral administration of the aqueous extract of *A. paniculata* in different doses causes a significant elevation of catalase, superoxide dismutase and glutathione S transferase activities. It reveals the antioxidant action of the aqueous extract of AP, which may play a role in the anticarcinogenic activity by reducing the oxidative stress. Lactate dehydrogenase (LDH) is used as tumor marker. They found a significant decrease in LDH activity on treatment with AP, which indicates a decrease in carcinogenic activity. A comparison with Doxorubicin (DOX), an anticancerous drug, indicates that the aqueous extract of AP is more effective than DOX with respect to its effect on catalase, superoxide dismutase, glutathione, S transferase as well as on lactate dehydrogenase activities in liver of lymphoma bearing mice. (Verma and Vinayak 2007).

Work on analysis of the anticancer phytochemicals in *Andrographis paniculata* under salinity stress done in Malaysia. 70-day-old plants grown in different salinity levels (0.18, 4, 8, 12, and 16 dSm(-1)) on sand medium. After inducing a period of 30-day salinity stress and before flowering, all plants were harvested and the data on morphological traits, proline content and the

three anticancer phytochemicals, including andrographolide (AG), neoandrographolide (NAG), and 14-deoxy-11,12-didehydroandrographolide (DDAG), were measured. Results indicated that the tolerant accessions were capable of accumulating the higher amounts of proline, AG, and NAG than the sensitive accessions. (Talei *et al.*, 2013).

Modulatory influence of *Andrographis paniculata* on mouse hepatic and extrahepatic carcinogen metabolizing enzymes and antioxidant status were studied. The findings indicate the chemopreventive potential of *Andrographis paniculata* against chemotoxicity including carcinogenicity. (Singh *et al.*, 2001).

Classical genetic solution to enhance the biosynthesis of anticancer phytochemicals in *Andrographis paniculata* were studied. The results revealed that *Andrographis paniculata* hybrids with low ecological demands can be introduced carefully to tropical areas with relatively fertile soils (and even poor soils) as a trustworthy source of versatile anticancer andrographolides for use as novel pharmaceutical compounds. Valdiani *et al.* (2014).

Experimental and clinical pharmacology of *Andrographis paniculata* and its major bioactive phytoconstituent Andrographolide were studied. The results revealed Andrographolide and its derivatives have anti-inflammatory effects in experimental models asthma, stroke, and arthritis and pharmacological activities such as those that are anti-inflammatory, antibacterial, antitumor, antidiabetic, anti-HIV, antifeedant, and antiviral. (Jayakumar *et al.*, 2013).

Both the plants studied *Andrographis paniculata* and *Ficus religiosa* possess anticancerous properties due to presence of certain phytochemicals. These medicinal plants are easily available, cheaper and possess no toxicity as compared to the modern (allopathic) drugs. There is a broad scope to derive the potent anticancer agents from medicinal plants in the development of therapeutically active herbal drugs.

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