



A REVIEW ON DAUCUS CAROTA AND PLUMBAGO ZEYLANICA

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ABSTRACT

Plumbago zeylanica is commonly known as a white chitraka, belongs to family plumbaginaceae. It is a perennial sub-scandent shrub, grows throughout India, especially in Bengal, Uttar Pradesh, South India and Sri Lanka and other countries and has a sound philosophical and experiential basis. It is distributed as a wild plant throughout the sultry and subtropical countries of the world. Traditionally it is used as a ulcer protective, stimulant, blood increasing expectorant, laxative, digestant, abortifacient and in the treatment of muscular pain rheumatic disease and some other disease. Carrot (*Daucus carota* subsp. *sativus*) is a widely cultivated root vegetable of high economic importance. The aroma of carrot roots and aboveground organs is mainly defined by terpenes. Treatments with purified polyacetylenes also induced apoptosis in a dose and time responsive manner. Moreover, faltarinol and faltarindiol-3-acetate isolated from *Daucus carota* L were more cytotoxic than faltarindiol. In contrast, the carotenoids showed no significant effect on either apoptosis or cell proliferation in any of the cells investigated.

KEYWORDS: *Plumbago zeylanica*, *Charak Samhita*, *Carotenoids*, *Daucus carota*, *Plumbaginaceae*.

INTRODUCTION

Carrots (*Daucus carota* subsp. *sativus* (Hoffm.), Apiaceae) are one of the most popular vegetables worldwide because of their pleasant taste, nutritional value, and health benefits (Fukuda et al., 2013). Different organs of the carrot plants accumulate different specialized metabolites. Ayurveda is time-tested science of treating disease with natural things like plant, animals and minerals. A scholarly description of the legacy of Charaka in contemporary idiom, best attempted with a commentary from modern medicine and science viewpoint, gives some glimpses of ancient wisdom. Indian healthcare consists of medical pluralism and ayurveda still remains dominant compared to modern medicine, particularly for treatment of a variety of chronic disease conditions. Phenylpropanes are a diverse class of plant specialized metabolites found throughout the plant kingdom, yet predominantly in angiosperms.

The plant species *Plumbago zeylanica* is distributed as a weed throughout the tropical and subtropical countries of the world. The family Plumbaginaceae consists of 10 genera and 280 species. *Daucus carota* L is a rich source of a number of compounds thought to have bioactive properties, including polyacetylenes and carotenoids. Polyacetylenes found within *Daucus carota* L include faltarinol (FaOH), faltarindiol (FaDOH) and faltarindiol-3-acetate (FaDOAc) and have demonstrated bioactive actions in a number of cell lines. The

biosynthetic pathway leading to eugenol^[3], isoeugenol^[4], methyleugenol^[5], and methylisoeugenol^[6] has been studied in several plant species. All phenylpropanes originate from phenylalanine and the general phenylpropanoid pathway.

PHARMACOLOGICAL ACTIVITIES

The plant *P. zeylanica* exhibits large numbers of medicinal properties which are describes as

Anti-inflammatoty activity

Plumbago species are one of the most important medicinal plants which are used for anti-inflammatory diseases. The root of *P. zeylanica* & *Daucus carota* extracted with methanol was used for determining the anti inflammatory effects.

Anti-bacterial activity The alcoholic extract from roots of *Plumbago zeylanica* was tested against multi-drug resistant of clinical origin (*Salmonella paratyphi*, *Staphylococcus aureus*, *Escherichia coli* and *Shigella dysenteriae*). The extract exhibited strong antibacterial activity against all tested bacteria.

Antioxidant activity *Daucus carota* as a in vitro antioxidant activity and total phenolic content of methanolic extracts *P. zeylanica* (root), *A. calamus* (rhizome), *H. indicus* (stem) and *H. antidysenterica* (bark). The order of antioxidant potential according to

FTC assay was found to be highest in *P. zeylanica*. Natarajan et al. (2006) carried out antioxidant activity.

Antimalarial Activity: Plumbagin shows antimalarial effects on *Plasmodium falciparum* enzyme, the succinate dehydrogenase (SDH). The activity has been 50% inhibited by the naphthoquinone plumbagin at an inhibitory concentration of 5mM. It also inhibited the in vitro growth of the parasite with a 50% inhibitory concentration of 0.27mM.

Antiviral activity: The antiviral activities of the 80% methanolic extracts of *Plumbago zeylanica* & *Daucus carota* been examined against coxsackievirus B3 (CVB3), influenza A virus and herpes simplex virus type1 Kupka (HSV-1) using cytopathic effect (CPE) inhibitory assays in HeLa, MDCK, and GMK cells, respectively. The antiviral activity of the most active compound was confirmed with plaque reduction assays. In addition, CVB3 was inhibited by the extracts of *Plumbago zeylanica*.

Antidiabetic activity Christudas Sunil and et al. also evaluated the antidiabetic effects of plumbagin isolated from *P.zeylanica* root and its effect on GLUT4 translocation in TZ-induced diabetic rats.^[17]

Hypo-lipidaemic activity Alpana (1996) studied effect of *P. zeylanica* in hyper-lipidaemic rabbits and its modification by vitamin E. There was significant reduction in serum total cholesterol, LDL cholesterol and triglyceride levels. Marked reduction was observed with the formulation of *P. zeylanica* and vitamin E. The total cholesterol/HDL and LDL/HDL cholesterol ratios were found significantly ($p<0.01$) decreased.^[20]

Antiplasmodial Action

Study carried out in-vitro screening of Indian medicinal plants for antiplasmodial properties against *Plasmodium falciparum*. Of 80 analysed ethanol extracts, from 47 species, significant effects were found for 31 of the extracts one of that was *P. zeylanica*.

Antifungal Activity Alcoholic extracts of *Plumbago zeylanica* showed strong antifungal against the pathogenic yeast, *Candida albicans* and dermatophytes, *Epidermophyton floccosum*, *Microsporum gypseum* and *Trichophyton rubrum*, Minimum inhibitory concentration (MIC) was found to be 4 mg/ml.^[18]

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Anticonvulsant Action

Study on pharmacological and clinical therapeutically uses of Ayurvedic medicinal plants, one of which was *P. zeylanica*. Leaf extract of this plant were evaluated for anticonvulsant Action using PTZ induced convulsion and maximum electro shocked induced convulsion. It was found that extract has no anticonvulsant Action.

Blood coagulation Action

The structure of *Plumbago zeylanica* active principle compound is similar to that of vitamin K. The *P. zeylanica* extract (2 mg/kg body weight) and naphthoquinone (2mg/kg body weight) given to individual groups were screened for Its effect on bleeding time (BT), clotting time (CT), prothrombin time (PT), platelet count and platelet adhesion in albino rats after 1-day, 15-day and 31-day treatment. There was no change observed in treated groups and control group but the platelet.

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Central nervous system activity

A study reported that hydro-alcoholic leaf extract of *P. zeylanica* & *docus carota* were evaluated for its CNS activity and it was found that the extract showed significant CNS depressant activity with the muscle relaxant properties. Vishnukanta et al., also investigated the anti-convulsant activity of hydro-alcoholic leaf extract of *P. zeylanica* and results showed that it did not possess the anti-convulsant activity.^[24-25]

Immunoenhancer benefits; The immunomodulatory effect of carrot-extracted carotenoid using 24 albino rats was studied. The percentage variation in lymphocytes, eosinophils, monocytes, and platelet count was evaluated. Interestingly, carotenoid administered rats showed a significant increase in lymphocytes, eosinophils, monocytes, and platelet concentration. The beneficial effect was due to carrot's α - and β -carotenoids.

Anticarcinogen The anti-carcinogenic effect of carrot juice extracts on myeloid and lymphoid leukemia cell lines. In vitro analysis was done on 72 hours incubation of carrot juice extracts in leukemia cell lines and non-tumor control cells. It was observed that carrot juice

extract possessed the ability to induce apoptosis and cause cell cycle arrest in leukemia cell lines. The effect was less prominent in myeloid and hematopoietic stem cells.

WOUND HEALING Animals treated with topical cream of ethanolic extract of carrot root, formulated at different concentrations, showed significant decreases in the wound area, epithelization period, and scar width when compared to control group animals in an excision wound model. Meanwhile, the rate of wound contraction significantly increased. Moreover, there were also significant increases in wound tensile strength, hydroxyproline content, and protein content in animals treated with the topical cream formulation of ethanolic extract of carrot seeds. The antioxidant and antimicrobial activities of ethanolic extract of carrot root, mainly flavonoids and phenolic derivatives, may be involved in this increased curative property.

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