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PHYTOCHEMICAL AND PHARMACOLOGICAL REVIEW ON BASELLA ALBA LINN

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ABSTRACT

Basella alba belongs to the family Basellaceae and commonly known as Malabar spinach, Indian spinach, Ceylon spinach and vine spinach. The ethanobotanical properties of Basella albahave been reviewed in this article. Various parts of the plant are used for treatment of the diseases as well as for different healing activities of human beings as well as animals across the globe especially in India and China. Its use has been discovered as anti inflammatory, anti oxidant, androgenic activity, antiulcer activity, cytotoxic and antibacterial activity, central nervous system (CNS) depressant activity, nephroprotective and woundhealing properties, as asperient, rubefacient and for catarrhl infections. Some of the compounds available especially in the plant are basellasaponins, kaempherol, diterpenes, phenols, tannins, flavonoids, etc. Several extracts like aqueous, chloroform, ethanol and petroleum has been used for different pharmaceutical activities.

KEYWORDS: *Basella alba*, Cytotxic, Anti-inflammatory, Anti oxidant.

INTRODUCTION

Basella alba L. (Family: Basellaceae) is an extremely heat tolerant, fast growing perennial vine. It is abundant in Malaysia, Philippines, South America, Topical Africa, and Brazil. It is a leafy vegetable. Nowadays, it is widely grown for its nutritive value. Almost in every area of Bangladesh and India, it is grown as a pot herb (Deshmukh et al., 2014). It is soft-stemmed vine, fast growing, reaching 10 meters (33 ft) in length, heart shaped leaves have a mild flavour and texture is mucilaginous. B. alba grows under full sunlight and its growth is slow in low temperature.

Phytochemical review

Basella alba is good source of vitamin A, vitamin C, vitamin B9 (folic acid), calcium, magnesium, iron and several vital anti oxidants in the plant. (Duke and Ayenshu, 1985; Palada and Crossman, 1999); also has proteins, fats, carbohydrates, fiber, ash, calcium, vitamins, thiamine, riboflavin and niacin (Grubben and Denton, 2004). According to Khare (2007) the plant consists the essential amino acids such as arginine, isoleucine, leucine, lysine, threonine and tryptophan alongwith several vitamins, minerals and a low percentage of soluble oxalates. Kaempherol is the flavonoid present in *Basella alba* at a concentration of 1.4mg/100g[]. Basella mucilage is viscous with low swelling capacity. Its pH is good for skin (5.3-5.4).

Basella alba contains basellasaponins,[6] amino acid such as arginine, leucine, isoleucine, lysine, threonine and tryptophan,[7] peptide, phenolic compounds in various extracts.[8] Basella fruit contains gomphrenin derivative which is betalain pigment.[9] The mucilage of B. alba consists of mixture of polysaccharides,[10] and starch-type glucan which can be separated by starch iodine complex. The leaves contain carotenoids, organic acids, water soluble polysaccharides, bioflavonoid and betacyanin.[11] The fruit contains gomphrenin derivative which is a betalain pigment (Glassgen et al., 1993). The mucilage of B. alba consists of mixture of polysaccharides (Palanuvej at al., 2009) and starch-type glucan which can be separated by starch iodine complex (Haq et al., 1969). Anthocyanins are a natural pigment which is responsible for the blue, purple, violet and red colours in fruits, flowers, stem and leaves.[9]

Pharmacological review

Anti-inflammatory activity

The methanolic extract of B. alba (MEBa) and aqueous extract of B. alba (AEBa) were studied for its in vitro anti-inflammatory activities. The potency of the extracts was compared with standard Diclofenac sodium (50 and 100 µg/ml). The aqueous extract showed the most significant membrane stabilizing action on human red blood cell membrane (Vijender et al., 2011). In cotton pellet induced granuloma, the test drugs 50% (BLE 250 mg/kg) and 60% (BLE 500 mg/kg) were found to be less potent than phenyl butazone as a standard (Krishna, 2012). Kachchhava (2006) have performed anti inflammatory activities of Basella alba extract on rats. He used two different phlogistic agents viz. carageeneen (1%) and formaldehyde (3, 5%) to carry out the activity on two inflammatory models. Phenylbutazone was used as a standard anti inflammatory drug. Aqueous extract of Basella alba at the dose of

500mg/kg and100mg/kg significantly reduced the inflammation. In the carageeneen induced inflammatory method they noted that, the pre ether extract of Basella alba did not exhibit significant anti inflammatory activity.

Anti-ulcer activity

The effect of Basella alba as an anti ulcer agent has studied by Venkatalakshmi and Senthamaraiselvi (2012). They treated 7-8 weeks old female albino Wistar rats with aspirin suspended in 1% carboxyl methyl cellulose at a dose of 150 mg/kg to induce the ulcer. The studies resulted that, aspirin altered parameters like ulcer index, percentage of ulcer inhibition, gastric pH, pepsin content, thiobarbituric acid reactive substances, lipid hydro peroxidases, SOD, GPx, CAT, GSH, vitamin C, and vitamin E were restored by the treatment of Basella alba leaf extract and indicated its anti ulcer activity.

Wound healing activity

Mohammed et al., (2012) studied wound healing capacity of Basella alba, in male albino rats. They created burn wounds on the back of rats and treated them with Basella alba leaf extract in glycerin for about 20 days. Their results concluded that, rats treated with aqueous leaf extracts showed a maximum wound healing capacity with significant wound closure and indicated wound healing capacity of Basella alba.

Cytotoxic and Antibacterial activity

The methanolic extract shows the significant growth inhibition on human cancer cell lines and momentous zone of inhibition for microorganisms studied. The overall result of this study indicates that the methanolic extract from B. alba have interesting anticancer and antibacterial properties, and the traditional use of this plant may also derive from itsantibacterial and anticancer properties (Rathee et al., 2010).

CNS depressant activity

Petroleum ether, methanol and aqueous extracts of dried aerial parts of B. alba were studied. CNS depressant activity of all the extracts of B. alba was evaluated by pentobarbitone induced sleeping time test, open field test and hole cross test in mice. Methanol extract (100 and 200 mg/kg, p.o.) showed highly significant ($p < 0.001$) CNS depressant activity than other extracts tested. All the results were compared with reference drug, diazepam (Anandarajagopal et al., 2011).

Antioxidant activity

B. alba fruit with dark blue skin and deep red violet flesh Kumar et al. 57 is a potential source of natural colorant. This study were aimed to evaluate the total betacyanin content, total phenol and to analyse the antioxidant activity against 1,1- diphenyl-2-picrylhydrazyl (DPPH) radical, superoxide anions, hydroxyl radical, metal chelating, hydrogenperoxide, fluorescence recovery after photobleaching (FRAP), 2,2'-azino-bis (ABTS) and deoxyribose degradation in a dose dependent manner. Betacyanin extracted from B. alba fruit exhibited excellent antioxidant activity (Reshmi et al., 2012; Sivasankar et al., 2011; Chanda and Dave, 2009). Anusuya et al., (2012) lypolized and homogenized the aerial plant parts of Basella rubra into powder. They employed various in vitro assays, such as DPPH, ABTS, reducing power, hydroxyl radical scavenging activity, superoxide radical scavenging activity and nitric oxide radical scavengingactivity, metal ion chelating ability and peroxidation inhibition activity to evaluate an antioxidant and free radical scavenging activities for aqueous, methanol and acetone extracts.

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