

## HERBAL NUTRACEUTICALS IN THE MANAGEMENT OF CANCER AND CHRONIC DISEASES-A SELECT STUDY

NITHYA DEVI M AND BRINDHA P\*

Centre for Advanced Research in Indian System of Medicine (CARISM), SASTRA University, Thanjavur, Tamilnadu.  
Email: brindha@carism.sastru.edu

Received: 5 Apr 2013, Revised and Accepted: 1 Oct 2013

### ABSTRACT

Recent researches focus towards studies on nutritionally rich herbal products as they contribute in the maintenance and promotion of health. Besides they are also found to be useful in controlling various disorders such as cancer, diabetes, as well in improving immunity. Recent records revealed consumption of multivitamin supplements daily by approximately 20-30% of population indicating high public interest towards the nutraceutical approach for the maintenance of health and prevention of chronic diseases.

Present work is taken up with a view to develop all herbal nutraceutical that can help significantly in the maintenance of health and thereby contribute in developing a disease free human society. In the present study, attempts were made to evaluate the nutraceutical potentials of select traditional drug sources that are commonly available in and around Thanjavur such as *Delonix elata* (L), *Erythrina variegata* (L) and *Eclipta alba* (L). Selected drug sources were collected, authenticated, shade dried, powdered and extracted with water and alcohol. Both powder and extracts were subjected to biochemical analysis and major nutrients present were identified and estimated. In the present work light is also thrown on these nutraceutical values determined of the selected sources and in the prevention and management of cancer, liver and inflammatory disorders.

**Keywords:** Nutraceuticals, Anticancer, Anti-inflammatory, Hepatoprotective, Traditional drug sources.

### INTRODUCTION

"Nutraceutical: name was coined by Stephan DeFelice in 1989. Nutraceuticals are non-specific biological interventions used for health promotion, in prevention of malignant processes and symptoms control. Owing to their safety and potential nutritional and therapeutic values, nutraceuticals have attracted considerable interest. Supplements are products derived from natural sources which are included in the diet with ingredients like vitamins, minerals, amino acids, but without any therapeutic effects. However nutraceuticals have the additional advantage in the prevention or management of diseases or disorders and used as a conventional food [1, 2, 3]. Nutraceuticals are currently receiving international recognition as having potential beneficial effects on health when consumed as part of a varied diet on a regular basis and at effective levels. Both the scientific community and the food industry are focusing their research to extend quality of life, and in particular, to treat and prevent chronic aging diseases [4]. A number of biological mechanisms and physiological processes are influenced by Nutraceuticals and positioned well due to their safety [5, 6]. Nutraceuticals are relatively safe and abundantly available from dietary sources. Therefore, alternate medicine researchers are attempting to harness the protective properties of these nonessential nutrients toward cancer prevention and treatment. Nutraceuticals such as phytochemicals show great promise in cancer treatment [7]. Considering the above aspects, an attempt was made

in the present work to develop herbal dietary supplements with high nutraceutical value from commonly available plants such as *Delonix elata* L [De], *Erythrina variegata* L [Ev] and *Eclipta alba* L [Ea] which are also known for their therapeutic values. *Delonix elata* L is useful in inflammatory joint disorders due to its potential [8]. *Erythrina variegata* L has been used as a medicine in tropical and subtropical regions, and is known to possess pharmacological activities including inhibition of the [Na.sup.+]/[H.sup.+] exchange system, antibacterial and anti-inflammatory effects [9]. *Eclipta alba* L is used as tonic for cirrhosis and to control infectious diseases. It is believed to prevent aging and to rejuvenate hair, teeth, bone, memory, eye sight, and hearing. [10]

### MATERIALS AND METHODS

Selected plants were collected from in and around Thanjavur, Tamil Nadu, India and botanically identified and authenticated. After proper identification and authentication, collected drugs were washed thoroughly three times with running water, dried under shade, ground into coarse powder and extracted with water and alcohol. Both powder and extracts were subjected to chemical analysis as per standard operating procedure employing X-ray Fluorescence spectrometer (XRF) and Carbon, Hydrogen, Nitrogen, Sulphur and Oxygen analyzer (CHNSO) and their nutraceutical values determined along with major Phytochemical constituents as per standard textual procedures(Ref).

### Family



Fig. 1: *Delonix elata* L [De]  
Family: Fabaceae



Fig. 2: *Erythrina variegata* L [Ev]  
Family: Fabaceae



Fig. 3: *Eclipta alba* L [Ea]  
Family: Asteraceae

## RESULTS AND DISCUSSION

### Nutraceutical values

Table 1: Micro Nutrients

Name of the parameters	<i>Delonix elata</i> L [De]	<i>Erythrina variegata</i> L [Ev]	<i>Eclipta alba</i> L [Ea]
Ash (%)	1.26	0.87	1.59
Carbon (%)	3.49	3.19	4.58
Nitrogen (%)	2.49	2.93	1.79
Phosphorus (%)	0.58	0.59	0.87
Potassium (%)	3.18	3.15	4.28
Sodium (%)	0.08	0.12	0.69
Calcium (%)	5.13	3.48	5.23
Magnesium (%)	3.19	2.24	3.91
Sulphur (%)	0.18	0.29	0.52
Zinc (ppm)	4.93	2.65	4.53
Copper (ppm)	0.51	0.58	1.29
Iron (ppm)	50.29	32.49	56.32
Magnesium (ppm)	14.20	6.79	12.54
Boron (ppm)	0.10	0.06	0.12
Molybdenum (ppm)	0.06	0.09	0.16

Table 2: Major Phytochemical constituents

Name of the parameters	<i>Delonix elata</i> L [De]	<i>Erythrina variegata</i> L [Ev]	<i>Eclipta alba</i> L [Ea]
Alkaloids (mg/kg)	1.44	0.62	0.79
Flavonoids (mg/kg)	2.56	1.63	2.54
Tannin (mg/kg)	0.69	0.22	0.79
Lignin (mg/kg)	0.72	0.20	0.87
Glycosides (mg/kg)	0.09	0.12	0.06
Serpentines (mg/kg)	0.06	0.16	0.08

Data of the results obtained revealed interesting informations on the nutraceutical potentials of the selected plants which could be used for the prevention and management of cancer, liver and inflammatory disorders their nutraceutical values and their potentials in the prevention and control of cancer will be discussed in sequel.

#### ***Delonix elata* L [De]**

It is rich in Calcium and Iron content which was present as much as 5.13% and 50.29 ppm (Table.1) respectively hence can be a good dietary supplement for cancer patients. This is because Calcium is a role in reducing colon cancer risk [11]. Iron is an essential micronutrient for both benign and neoplastic cells. An adequate balance of iron is critical for good health, as iron deficiency leads to anemia, a major world-wide public health problem, and iron overload increases the oxidative stress of body tissues leading to inflammation, cell death, system organ dysfunction, and cancer. Plant iron (i.e. nonheme iron) is not considered to be a major offender of iron overload [12]. Recommended Dietary Allowance for iron in healthy adults is 10mg per day for men and 15mg for premenopausal women. Premenopausal women's need for iron is higher than men because women lose iron during menstruation [13]. Presence of iron as much as 50.29 ppm makes it a good dietary supplement for cancer patients in maintaining a good hematopoietic system, selected plant drug is also rich in zinc (4.93%) which can act as a good antioxidant [17, 18]. Besides this plant is rich in Flavanoids content (2.56%), hence it can be a good immuno booster and could be much useful as a diet for patients suffering from chronic diseases, and can contribute in improving the disease resistance particularly in inflammatory conditions.

#### ***Erythrina variegeta* L [Ev]**

Nutritional analysis of this plant revealed presence of moderate percentage of sodium (0.12%) potassium (3.15%) and calcium (3.48%) It has been used in a folk medicine in tropical and subtropical regions for antibacterial and anti-inflammatory effects, and is known to possess pharmacological activities including inhibition of the Na<sup>+</sup>/H<sup>+</sup> exchange system, antibacterial and anti-inflammatory effects [14]. It is rich in flavanoids (1.63%) hence can be a good antioxidant supplement to maintain normally in haematological parameters and antioxidant status. These nutraceutical values render it to be a good dietary supplement for cancer patients [15]. It is rich in Manganese (6.79ppm) Magnesium (2.54%) hence it can act as a good antioxidant [16, 19].

#### ***Eclipta alba* L [Ea]**

This plant is abundant in zinc (4.53ppm), generally zinc could be efficacious in the prevention and treatment of several cancers viz., colon, pancreas, oesophageal and head and neck, Zinc is known to be an essential component of DNA-binding proteins with zinc fingers, as well as copper/zinc superoxide dismutase and several proteins involved in DNA repair. Thus, zinc plays an important role in the functions of transcription factor, antioxidant defense system and DNA repair. Dietary deficiencies in the intake of zinc can contribute to single and double-strand DNA breaks and oxidative modifications to DNA that increase risk for cancer development [17, 18]. *Eclipta alba* L is rich in Manganese (12.54ppm) Manganese deficiency is often observed in cancer incidence. Mostly cancer cells are very low in manganese content or sometimes manganese in the cells are totally lacking. An anti-cancer preparation containing manganese along with flavanoid [19] could act as good anticancer dietary supplement. Flavanoid (2.54mg/kg) is also present in this plant; Mechanisms of action of flavanoids in reducing tumor have been identified, such as carcinogen inactivation, anti proliferation, cell cycle arrest, induction of apoptosis and differentiation, inhibition of angiogenesis, antioxidation and reversal of multidrug resistance or a combination of these mechanisms. Based on these, flavonoids can be a promising dietary supplement for cancer patients [20]. Potassium content of this plant is also found to be high (4.28%), Cancer cells need a high amount of sodium and cannot function when there is no potassium. So it is recommended for cancer patients to have a diet that is low in sodium and high in potassium and with a greater intake of ionized water to ensure the body's biological terrain so as

to discourage cancer growth. This plant can thus act as supplement for the patients suffering from cancer [21, 22].

The data of the results obtained in the present work in arresting cancer cell growth shows that all the plants selected and evaluated for their Nutraceutical potential possesses nutraceutical revealed nutrients to present and to manage cancer condition. Further in depth studies coupled with preclinical and clinical trials on these plants may result in the development of an efficacious, cost effective and an eco friendly dietary supplement. Though these herbs are valued as potent herbal dietary supplements, while preparing any product from these sources care must be taken to collect them from clean environment must be washed thoroughly and must be checked for heavy metal and microbial contamination. Authentic herbs, processed as per Ayurvedic methods will certainly contribute in the development of effective herbal products including dietary supplements.

#### **REFERENCE**

1. Caballero B, Dietary Supplements, The Johns Hopkins University review, 2006
2. Kalra EK , Nutraceutical - Definition and Introduction **AAPS Pharm Sci**; 2003; 5(3):Article 25,
3. De Felice SL. FIM. Rationale and proposed guidelines for the nutraceutical research & education act -NREA, 2002
4. Silvia Mandela, *et al* Proceedings from the Third International Conference on Mechanism of Action of Nutraceuticals. **Journal of Nutritional Biochemistry** 2005; 16:513-520.
5. T. E. McAlindon Nutraceuticals: do they work and when should we use them? **Clin. Rheumatol** 2006; 20 99-115.
6. J. Bernal, *et al.*, Advanced analysis of nutraceuticals, **J. Pharm. Bio med. Anal** 2010; doi:10.1016/j.jpba.2010.11.033.
7. Sabita N. et al The Role of Nutraceuticals in Chemoprevention and Chemotherapy and Their Clinical Outcomes. **Journal of Oncology** 2012; Article ID 192464, 23 pages
8. Rao et al. Anti-Inflammatory Activity of The Leaves and Bark of *Delonix Elata*. **Ancient Science of Life** 1997; Vol No. 17 (2):141-143.
9. M. Sato et al Antibacterial property of isoflavonoids isolated from *Erythrina variegeta* against cariogenic oral bacteria. **Phytomedicine: International Journal of Phytotherapy & Phytopharmacology** 2003; ISSN 0944-7113.
10. Mithun et al. *Eclipta alba* (L.) A Review on its Phytochemical and Pharmacological Profile **Pharmacologyonline** 2011; 1:345-357.
11. Michael S Donaldson et al., Nutrition and cancer: A review of the evidence for an anti-cancer Diet, **Nutrition Journal** 2004; 3:19.
12. M. E. Martinez, et al, Calcium, vitamin D, and the occurrence of colorectal cancer among women. **J Natl Cancer Inst**, 1996; 88:1375-1382.
13. Yeong Sek Yee & Khadijah Shaari, Iron and cancer, **e-Journal of Traditional & Complementary Medicine** 2011 .
14. V. H. Deshpande et al., Erythrinins A, B & C, three new isoflavones from the bark of *Erythrina variegeta*. **Indian J Chem** 1997; 15B: 205-207.
15. N. Baskar et al., Evaluation of anticancer activity of ethanolic extract of *Erythrina variegeta* Linn, **International journal of pharmacy and Industrial Research** 2012; 2.
16. P. Brindha et al, Elemental And Nutraceutical Values Of Common Plants Of Sastra Campus A Select Study, **Int J Pharm Pharm Sci** 2012; Vol 4, Suppl 2, 36-39
17. E. Ho Zinc deficiency, DNA damage and cancer risk. **J Nutr Biochem** 2004; 15: 572-8.
18. D. K. Dhawan et al., Zinc: A promising agent in dietary chemoprevention of cancer **Indian J Med Res** 132, pp 676-682. 2010,
19. D. L. McColester **Biochem. Soc. Trans.** 1979; 7(5):1068-1069
20. Wenying Ren et al., Flavonoids: Promising Anticancer Agents, **Medicinal Research Reviews**, 2003; Vol. 23, No. 4, 519-534,
21. Rigo Alberigo, Cancer and a Low Sodium, High Water, High Potassium Intake, Antiangiogenic Diet, Article by Integrated medicine Institute.
22. Kune et al., Dietary sodium and potassium intake and colorectal cancer risk. **Nutrition and Cancer**, 1989; 12(4):351-9.