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Editorial

Non-conventional sources, antioxidative properties, and novel medicinal use of plant derivatives

Medicinal plants have become indispensable in the present age, even though one can not completely overcome the dependence on the synthetic drugs. The medicinal plants and their derivatives have properties which make them safer and alternatives to commercial drugs in many countries. These medicinal plants are not only available at an affordable cost, but are widely distribute and can be propagated by the local population. Most of these plant derivatives from the leaf, stem or roots have cellular components with high potential antioxidants, which are commercially exploited as herbal medicines. In the present paper the medicinal properties of whole plant, their parts (leaf, stem, root etc.), and methodology for extract and assessment of plant extracts are explained.

Non-conventional sources (whole plant)

In this issue Rhee et al. (2009) reviewed the pharmacological potential of *Salicornia herbacea* L. (Chenopodiaceae) a halophyte (salt loving salt-marsh plant) from Korea. *S. herbacea* known as 'Tungtungmadi' in Korea and distributed in tidel belts of West coast of Korea (Lee et al. 2004, 2006). The authors discussed the traditional knowledge, ethno biological and ethno medicinal use, identification of pharmacologically important molecules, and pharmacological studies of this under utilized plant. This plant is consumed as a food in some recipes and a medicine against obesity, constipation and hepatitis, nephropathy, hepatitis and diarrhea or constipation in Korea. It is also used in traditional medicines for the treatment of intestinal ailments, nephropathy, and hepatitis, atherosclerosis, hyperlipidemia, and diabetes in Oriental countries. Pharmacological analysis showed that *S. herbacea* anti-oxidative, anti-microbial, anti-proliferative, and anti-inflammatory activities. The active ingredients of biological and pharmacological activities of *S. herbacea* is reported to be due to tungtungmadic acid, quercetin 3-O-glucoside, and isorhamnetin 3-O-glucoside. These compounds show various pharmacological properties such as its anti-oxidative, anti-inflammatory and immunomodulatory activities. The possible role of these compounds on the nitric oxide mediated signal transduction in immunomodulatory, anti inflammatory and anti-oxidant activities are suggested.

A wider survey was done by Didier et al. (2009) about the ethnopharmacology of *Loranthaceae* in Africa - Cameroon. *Loranthaceae* are tropical hemi parasites and epiphyte plants with 950 species and 77 genera. In Cameroon, 7 genera including 26 species have been inventoried. These plants contain high conctrations of Linoleic, palmitic and oleic acids, saponosides, steroids and terpens, sugars, alkaloids and growth substances. The seeds and leaves of *Loranthaceae* have high contrations of antioxidants such as Ascorbate, phenolics, phenylpropanoids and flavonoids and, Viscotoxines - proteins of Vester and lectines which are reported to have anticancerous propeties (Kienle and Kiene, 2007). In Africa, few investigations on therapeutical importance of *Loranthaceae* are made in Nigeria (Oboh and Nworgu, 2008; Okpuzor et al., 2009).

Traditionally *Rheum ribes* L. has been used in Iran as sedative and mood enhancer. This study by Sayyah et al. (2009) investigated the efficacy and safety of a hydroalcholic extract of *R. ribes* in treatment of mild to moderate major depression disorder and the observations show some anti depressive effects of *Rheum* extracts.

Methodological approach

Vimalnathan and Hudson (2009) in their elegant experimental study showed multiple inflammatory and antiviral activities in *Adansonia digitata* (Baobab) leaves, fruits and seeds. *A. digitata* (local name: Baobab, Family Bombacaceae) is a traditional African medicinal plant. Almost all parts of the plant, especially leaves, fruit pulp, seeds and bark fibers, have been used traditionally for medicinal and nutritional purposes. The authors compared leaf, fruit-pulp and seed extracts for their antiviral properties against influenza virus, herpes simplex virus and respiratory syncytial virus. Also the effect of the extracts on cytokine secretion (IL-6 and IL-8) in human epithelial cell cultures were studied. The leaf extracts had the

most potent antiviral properties, with influenza virus being most susceptible. Pulp and seed extracts were also effective antiviral agents. Wide range bioactive compounds are observed in different parts of the plant and these activities could explain some of the medical benefits of the plant extracts.

In another methodological study Khalafalla et al. (2009) studied antileukemia activity of extracts from root cultures of *Vernonia amygdalina* Del (Family Compositae), an African medicinal plant well known for producing the anticancer agents vernodaline and vernolide in its roots. The variability in the sources of roots from its natural habitat prompts it necessary to establish a fast-growing root culture and to test the active ingradients against leukemia (a form of cancer) cells in vitro. Water and ethanol extracts from these roots showed significant antioxidant activity and efficacy against leukemia cells probably by regulating cellualar apotosis.

Root

Ashafa and Afolayan (2009) screened the root extracts from *Biden pilosa* L. var. *radiata* (Asteraceae) for antimicrobial potentials (South Africa.). *Bidens pilosa* L. is widely used in traditional medicine for anti-glycemic, anti-ulcerogenic, anti-inflammatory, vaso dilative, hypotensive, antimalarial, hepato-protective, antipyretic, anticancer and antitumor, antioxidant, antiviral, antifungal and anti-bacterial, activities. Concerning the antimicrobial activity of this species, the available reports in literature focused on either the aerial part or the whole plant. However, few attempts were made on the studies on root components of *B. pilosa* for medicinal use. In this study Ashafa and Afolayan (2009) attempted a screening of root extracts of *Bidens pilosa* L. (South African ecotype) for antimicrobial activity. The methanol extract inhibited all Gram-positive and Gram-negative bacteria with minimum inhibitory concentrations ranging from 5 to 10 mg/ml. The acetone extract was able to suppress the growth of *Staphylococcus aereus*, *Staphylococcus epidermidus, Escherichia coli* and *Klebsella pnuemoniae* in the same concentration range as the methanol extract. All the extracts exhibited 100% inhibition against *Penicilium notatum* at 0.1 mg/ml. All the extracts (aqueous, acetone and alcoholic) showed antifungal activity against *Aspergillus niger* but not for *A. flavus*.

Fruit

Wild raspberries are traditionally a part of the Turkish diet and are very rich sources of bioactive compounds such as phenolics, anthocyanins, organic acid etc. So the evaluation of raspberry fruit genetic resources for bioactive compounds is of significance for breeders, food and pharmaceutical industry (Badjakov et al., 2008). In a study Celik and Ercisli (2009) report lipid and fatty acid composition of wild and cultivated red raspberry fruits (*Rubus idaeus* L.) from Turkey. The eleven wild red raspberry genotypes and one cultivar studied contained 10 major fatty acids. Linoleic acid and linolenic acid was the main fatty acids for all genotypes. All wild genotypes had higher amount of linoleic, palmitic and stearic acid than cultivated one suggesting the importance of these wild materials for future breeding studies to incorporate these fatty acids in new cultivars.

Leaf

Oxidative stress is one of the major factors for inducing chronic and degenerative diseases including atherosclerosis, ischemic heart disease, ageing, diabetes mellitus, cancer, immunosuppression, neurodegenerative diseases (Young and Woodside, 2001). So the most effective way to combat the action of free radicals which cause the oxidative stress is antioxidants. Aromatic, medicinal, spice and other plants contain chemical compounds like ascorbic acid, carotenoids and phenolics exhibiting antioxidant properties (Pourmorad et al., 2006). Antioxidants are known to inhibit lipid peroxidation, to scavenge free radicals and active oxygen species (Suresh et al., 2008; Valko et al., 2006). Aliyu et al (2009) from Nigeria. & South Africa evaluation of antioxidant activity of leave extract of *Bauhinia rufescens* Lam. (Caesalpiniaceae). There is another report from India on antioxidant activity of extracts from medicinal plants (Prakash et al. (2009). The methanolic extracts of *Desmodium gangeticum* (Linn.), *Eclipta alba* (Linn.) *Ocimum sanctum*(Linn.), *Piper longum* (Linn.), *Solanum nigrum* (Linn.) and *Amaranthus caudatus* (Linn.) were screened for their free radical scavenging properties. The antioxidant activity was in the decreasing order for the plants are *D. gangeticum*, *A. caudatus*, *S. nigrum*, *P. longum*, *E. alba* and *O. sanctum*. The phenolic antioxidant content was highest in *O. sanctum* (Linn.). These studies suggest the importance of oxidative metabolism in infections and diseases such as heart disease, stroke, arteriosclerosis, diabetes mellitus, cancer, malaria, rheumatoid arthritis, neuro-degenerative diseases (Alzheimer's and Parkinson's diseases) and AIDS (Olukemi et al., 2005; Valko et al., 2006). These work have been done mostly on leaf extracts.

In a study on the leaf extracts, Liu et al. (2009) reported antitussive, expectorant and antiasthmatic activities of different solvent extracts from *Ficus microcarpa.* The water fraction was purified by a ceramic membrane to give membrane

fraction and then the evaporated water extract was extracted with alcohols. The animal experimental results showed the membrane fraction had remarkable antitussive and expectorant activities. The water and methanol fractions can prolong latency time of cavy and are regarded as effective antiasthmatic fractions.

The Moringa tree is a multi-function plant of tropical regions with high nutritional value for both humans and livestock and is well documented for its medicinal importance for a long time. The stem bark, root bark, fruit, flowers, leaves, seeds and gum are widely used in Indian folk medicine. The aqueous extract from the leaves of *Moringa oleifera* was evaluated for its oral toxicity by the oral route, and for the sub-acute toxicity on haematological, biochemical and histological parameters in rats by Adedapo et al (2009). The safety evaluation of the aqueous extract of the leaves of Moringa oleifera in rats is reported. The extracts did not cause any significant change in the level of platelets, but showed significant changes in the levels of total proteins, liver enzymes, and bilirubin. Clinico-pathologically, changes were also noted in the body weights, slight dullness at the onset of extract administration and no significant changes were noticed in all the organs examined in the course of this study. The study concluded that the plant is relatively safe both for nutritional and medicinal uses.

Recommendation

These studies on methodological aspects, survey of plant kingdom for the use of various plants, not yet exploited for medicinal use, and the assessment of adverse effects of traditional medicinal components. The antioxidative properties of the different plant parts and their extracts, and their efficacy in combating oxidative or stress related pathogenic symptoms, is an interesting finding of the papers reported in this issue. The initiatives on un-common plants belonging to various families of plants are a step forward for an initiative in a consorted effort for bio-medical analysis of the active ingredients from different parts of these medicinal plants for the future.

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Dr. (Mrs.) Meena Misra
Institute of Frontier Sciences & Biotechnology,
116B, BDA Colony, Baramunda, Bhubaneswar-751003,
India

Associate Editor