Evaluation of protective effect of *Aegle marmelos* Corr. in an animal model of chronic fatigue syndrome

To evaluate ethanolic extract of leaves of *Aegle marmelos* in an experimental animal model of chronic fatigue syndrome for potential therapeutic benefit was conducted. Age/weight-matched female Wistar albino rats were grouped into five groups. (Group I- V) (*n* = 8). Group I served as naïve control and II served as stress control. Except for group I animals, other group animals were subjected to forced swimming every day for 15 minutes to induce a state of chronic fatigue and simultaneously treated with ethanolic extract of *Aegle marmelos* (EEAM) 150 and 250 mg/kg b.w. and Imipramine (20 mg.kg b.w.), respectively. Duration of immobility, anxiety level and locomotor activity were assessed on day 1, 7, 14 and 21 followed by biochemical estimation of oxidative biomarkers at the end of the study. Treatment with EEAM (150 and 250 mg/kg b.w.) resulted in a statistically significant and dose dependent reduction (*P* <0.001) in the duration of immobility, reduction in anxiety and increase in locomotor activity. Dose dependent and significant reduction in LPO level and increase in CAT and SOD was observed in extract treated animals. The results are suggestive of potential protective effect of *A. marmelos* against experimentally induced CFS [Vanphawng Lalremrutha and Gurunath S Prasanna* (Department of Pharmacology, KLE University's College of Pharmacy, Rajajinagar, Bangalore, India), *Indian J Pharmacol*, 2012, 44(3), 351-56].

Antioxidant activity of a new phenolic glycoside from *Lagenaria siceraria* Stand. fruits

The antioxidant properties of different extracts of *Lagenaria siceraria* (bottle gourd) fruit were evaluated. In the process, a new phenolic glycoside (**E**)-4-hydroxymethyl-phenyl-6-O-caffeoyl-β-d-glucopyranoside (1) was isolated and identified together with 1-(2-hydroxy-4-hydroxymethyl)-phenyl-6-O-caffeoyl-β-d-gluco-pyranoside (2), protocatechuic acid (3), gallic acid (4), caffeic acid (5) and 3,4-dimethoxy cinnamic acid (6). Their structures were elucidated by extensive NMR experiments including *H–*H (COSY) and *H–*13C (HMQC and HMBC) spectroscopy and chemical evidences. The antioxidant potential of the compound 1 and 2 was tested in different *in vitro* assay systems such as free radical scavenging assay, 3-(4, 5-dimethylthiazole-2-yl)-2, 5-diphenyl-tetrazolium bromide (MTT) reduction assay, superoxide scavenging activity, reducing power assay and linoleic acid peroxidation assay [Rahul Mohan, Rahul Birari, Aniket Karmase, Sneha Jagtap and Kamlesh Kumar Bhutani (Department of Natural Products, National Institute of Pharmaceutical Education and Research, Sector 67, SAS Nagar, Mohali 160 062, Punjab, India), *Food Chemistry*, 2012, 132(1), 244-251].

Phenolic content, antioxidant, anti-inflammatory and anticancer activities of the edible halophyte *Suaeda fruticosa* Forssk

*Suaeda fruticosa* is an edible and medicinal halophyte known for its hypoglycaemic and hypolipidaemic activities. In this study, novel biological activities of the shoot extracts related to their phenolics were investigated. Results showed an appreciable total phenolic (31.8mgGAE/gDW) in shoot extracts. The estimation of antioxidant capacities using oxygen radical absorbance capacity (ORAC method) and a cell based-assay (WS1) of four extracts (hexane, dichloromethane, methanol and water) showed that shoot methanol extract exhibit the highest antioxidant activities. The same extract displayed the utmost anti-inflammatory activity, inhibiting nitric oxide (NO) release, by 66.4% at 160 μg/ml in lipopolysaccharide (LPS)-stimulated RAW 264.7 macrophages. Besides,
the dichloromethane extract showed the highest anticancer activity against human lung carcinoma (A-549) and colon adenocarcinoma cell lines (DLD-1, Caco-2 and HT-29) with specificity against DLD-1 ($IC_{50}=10\pm1\mu\text{g/ml}$). These findings demonstrate the remarkable potentiality of this edible halophyte as valuable source of antioxidants which exhibit original and interesting anti-inflammatory and anticancer capacities [Samia Oueslati, Riadh Ksouri*, Hanen Falleh, André Pichette, Chedly Abdelly and Jean Legault (Laboratoire des Plantes Extêmophiles, Centre de Biotechnologie à la Technopôle de Borj-Cédria (CBBC), BP 901, 2050 Hammam-Lif, Tunisia), Food Chemistry, 2012, 132(2), 943-947].

**NPARR 3(3), 2012-0310, Anti-inflammatory effect of phenethyl isothiocyanate, an active ingredient of Raphanus sativus Linne**

Phenethyl isothiocyanate (PEITC) is an active ingredient of *Raphanus sativus* Linne (Cruciferae). However, regulatory mechanism of PEITC involved in caspase-1 signalling has not been fully elucidated in mast cells. First, PEITC inhibited the production of IL-6 through the inhibition of caspase-1/receptor-interacting protein 2, followed by regulation of NF-κB/IκBα pathway or p38 and extracellular signal-regulated kinase mitogen-activated protein kinases. Second, PEITC inhibited the IL-1β production through the inhibition of caspase-1 proteolytic activity. Overall, these results provide a proof that PEITC can inhibit the inflammatory reactions by two distinct pathways in mast cells and open new perspectives to pharmacologically manipulate the expression and production of IL-6 and IL-1β by molecules acting on the caspase-1 pathway [Phil-Dong Moon, and Hyung-Min Kim (Department of Pharmacology, College of Oriental Medicine, Institute of Oriental Medicine, Kyung Hee University, 1 Hoegi-dong, Dongdaemun-gu, Seoul 130-701, Republic of Korea), Food Chemistry, 2012, 131(4), 1332-1339].

**NPARR 3(3), 2012-0311, Haematological effects of aqueous extract of ornamental plants in male Swiss albino mice**

Treatment of mice with crude extract of *Hibiscus rosa sinensis* flowers (500 mg/kg BW) and *Bougainvillea spectabilis* leaves (800 mg/kg BW) for a period of 30 days indicates a significant increase in the level of hemoglobin and count of RBC but a significant decline in the level of MCH and MCV in the former case. On the other hand, in *B. spectabilis* treated animals, the level of hemoglobin, RBC count & PCV declined significantly. Hence, it is concluded that the use of *H. rosa-sinensis* whereas may not cause any adverse effect on animals, *B. spectabilis* is to be used with care as its chronic use may cause anemia [N Mishra* and VL Tandon (Department of Bioscience and Biotechnology, Banasthali University Banasthali, Rajasthan-304022, India), Vet World, 2012, 5(1), 19-23].

**NPARR 3(3), 2012-0312, Antimicrobial, antioxidant and phytochemical investigations of sea buckthorn (*Hippophaë rhamnoides* L.) leaf, stem, root and seed**

The antimicrobial and antioxidant activities of crude ethanolic extract from *Hippophaë rhamnoides* L. (Elaeagnaceae) leaf, stem, root and seed, and their respective fractions, obtained by liquid–liquid extraction (LLE) using hexane (HF), ethyl acetate (EAF) and water (WF), were investigated. The crude extract was obtained by Pressurised Liquid Extraction (PLE), using ethanol at 100 bar and 60°C. Antimicrobial activity was tested against food-borne and clinical microorganisms. Antioxidant activity was measured using the DPPH-radical scavenging and the ferric reducing antioxidant power (FRAP) assays. The phytochemical contents were examined by colorimetric methods. The results showed that crude extracts were active against Gram− and + strains, and that seed and root extracts were better...
radical scavengers than leaf and stem extracts. For all organs, the two activities tested were found to be higher in WF. These activities were correlated with the presence of phenolic compounds in active fractions. High Performance Thin Layer Chromatography (HPTLC) fingerprints confirmed presence of phenolic compounds in active extracts and fractions [Thomas Michel, Emilie Destandau*, Gaëtan Le Floch, Marie Elisabeth Lucchesi and Claire Elfakir (Université d’Orléans, CNRS UMR 6005, Institut de Chimie Organique et Analytique (ICOA), BP 67059, rue de Chartres, 45067 Orléans Cedex 2, France), *Food Chemistry, 2012, 131(3), 754-760].

NPARR 3(3), 2012-0313, **Antihyperlipidemic potential of Cedrus deodara extracts in monosodium glutamate induced obesity in neonatal rats**

The antihyperlipidemic effect of *Cedrus deodara* against monosodium glutamate (MSG) induced obesity in neonatal rats was studied. The studies were carried out on newborn neonatal rats and were injected intraperitoneally with 2 mg/g of MSG on the 2nd and 4th postnatal days and 4 mg/g on 6th, 8th and 10th postnatal days. Ethanolic extract (EE) and acetone extract (AE) of *C. deodara* was administered in a dose of 100 and 200 mg/kg, p.o./day at the age of 65 days. On day 60 of treatment, body weight, locomotor activity, body temperature, and various biochemical parameters like serum glucose, total cholesterol, triglyceride, and organs weights were recorded. There was a significant reduction in body weight, organs and increased body temperature, locomotor activity after treatment with extracts. *C. deodara* decreased serum glucose, total cholesterol and triglyceride, low density lipoprotein (LDL) and very low density lipoprotein (VLDL) levels and increased high density lipoprotein (HDL) significantly compared to MSG-control rats. *C. deodara* extracts exhibited antihyperlipidemic effect and it possesses anti-obesity properties in MSG induced obese rats [Sudhir Patil, T Prakash, D Kotecha, N Rama Rao and Naitik Pandy (Department of Pharmacology, Acharya and B.M. Reddy College of Pharmacy, Bangalore-560 090, India), *Indian Journal of Pharmacology*, 2011, 43(6), 644-647].

NPARR 3(3), 2012-0314, **Protective effect of aqueous extract of Oroxylum indicum Linn. (root bark) against DNBS-induced colitis in rats**

Aqueous root extract of *Oroxylum indicum* was evaluated in rats against dinitrobenzene sulfonic acid (DNBS) induced colitis. Rats were pre-treated orally for seven days and continued for four days after the induction of colitis with OI aq (100, 200, and 400 mg/kg) or vehicle. Colitis was induced by intracolonic instillation of 25 mg of DNBS per rat dissolved in 50% alcohol and 4 days later, the colonic mucosal damage was analyzed along with food intake, body weight, colon weight, spleen weight, histological damage, myeloperoxidase (MPO) activity, malondialdehyde (MDA) levels, reduced glutathione (GSH), and nitric oxide levels in colonic tissue homogenate. Significant reduction in gross damage area, weight loss and increase in colonic and spleen weight were evident in test substance-pretreated animals' dose dependently as compared to vehicle treated control. These effects were confirmed biochemically by a reduction in colonic myeloperoxidase activity, malondialdehyde levels, nitric oxide levels, and increase in reduced glutathione (GSH) levels. Furthermore, microscopic examination revealed diminution of inflammatory cell infiltration and submucosal edema in colon segments of rats treated with OI aq. The results demonstrate the protective effect of OI aq in the animal model of acute colitis possibly through an antioxidant, anti-lipoperoxidative or due to reduction in nitric oxide generation [Shrikant V Joshi*, Bhavin A Vyas, Payal D Shah, Dinesh R Shah, Shailesh A Shah, Tejal R Gandhi (Department of Pharmacology, Maliba Pharmacy College, Gopal
Screening of Ficus religiosa leaves fractions for analgesic and anti-inflammatory activities

The different fractions of dried leaves of Ficus religiosa Linn for analgesic and anti-inflammatory activity using different models of pain and inflammation. The analgesic activity of F. religiosa carried out using acetic acid-induced writhing in mice and tail flick test in rats. The anti-inflammatory activity was evaluated using carrageenan-induced rat paw edema and cotton pellet-granuloma formation in rats. Five different fractions (FRI, FRII, FRIII, FRIV and FRV) of F. religiosa at the dose level of 20 and 40 mg/kg, p.o were tested. The fraction FRI (40 mg/kg, p.o.) and FRII (40 mg/kg, p.o) were found to be more effective (P<0.01) in preventing carrageenan induced rat paw edema, cotton pellet granuloma formation, and acetic acid induced writhing compared to the other fractions. FRI (20 mg/kg, p.o.) and FRIII (20 mg/kg, p.o) were also found to be more effective in increasing latency period in tail flick method. Out of five different fractions of F. religiosa leaves tested, FRI and FRIII possess potent analgesic and anti-inflammatory activities against different models of inflammation and pain [Vishal Gulecha*, T Sivakumar, Aman Upaganlawar, Manoj Mahajan and Chandrashekhar Upasani (Department of Pharmacology, SNJB'S SSDJ College of Pharmacy, Neminagar, Chandwad, Nashik;Department of Medicinal Chemistry, Nandha College of Pharmacy, Erode, Tamil Nadu, India), Indian Journal of Pharmacology, 2011, 43(6), 656-661].

This study was undertaken to evaluate the neuroprotective activity of Wedelia calendulacea against cerebral ischemia/reperfusion induced oxidative stress in the rats. The global cerebral ischemia was induced in male albino Wistar rats by occluding the bilateral carotid arteries for 30 min followed by 1 h and 4 h reperfusion. At various times of reperfusion, the histopathological changes and the levels of malondialdehyde (MDA), glutathione peroxidase (GPx), glutathione reductase (GR), glutathione-s-transferase (GST), and hydrogen peroxide (H$_2$O$_2$) activity and brain water content were measured. The ischemic changes were preceded by increase in concentration of MDA, hydrogen peroxide and followed by decreased GPx, GR, and GST activity. Treatment with W. calendulacea significantly attenuated ischemia-induced oxidative stress. W. calendulacea administration markedly reversed and restored to near normal level in the groups pre-treated with methanolic extract (250 and 500 mg/kg, given orally in single and double dose/day for 10 days) in dose-dependent way. Similarly, W. calendulacea reversed the brain water content in the ischemia reperfusion animals. The neurodegeneration also conformed by the histopathological changes in the cerebral-ischemic animals. The findings from the present investigation reveal that W. calendulacea protects neurons from global cerebral-ischemic injury in rat by attenuating oxidative stress [Tigari Prakash, Dupadahalli Kotresha and Rama Rao Nedendla*(Department of Pharmaceutical Chemistry, Chalapathi Institute of Pharmaceutical Science, Guntur - 522 034, Andhra Pradesh, India), Indian Journal of Pharmacology, 2011, 43(6) 676-682].

Antidiarrheal potential of standardized extract of Rhododendron arboreum Smith flowers in experimental animals

To investigate standardized ethyl acetate fraction of Rhododendron arboreum (EFRA) flowers for antidiarrheal activity in experimental
animals. A simple sensitive high performance thin layer chromatography (HPTLC) method was used for the determination of hyperin in EFRA. The standardized fraction was investigated for castor oil, magnesium sulfate-induced diarrhea, measurement of gastrointestinal transit using charcoal and castor oil-induced enteropooling. The concentration of hyperin in flowers of *R. arboreum* was found to be 0.148% by HPTLC. Oral administration of EFRA at 100, 200 and 400 mg/kg exhibited dose-dependent and significant (P<0.05-0.001) antidiarrheal potential in castor oil and magnesium sulfate-induced diarrhea. EFRA at doses of 100, 200 and 400 mg/kg also produced significant (P<0.05-0.001) dose-dependent reduction in propulsive movement in castor oil-induced gastrointestinal transit using charcoal meal in rats. EFRA was found to possess an antienteropooling in castor oil-induced experimental animals by reducing both weight and volume of intestinal content significantly. These findings demonstrate that standardized ethyl acetate fraction of *R. arboreum* flowers has potent antidiarrheal activity thus justifying its traditional use in diarrhea and have great potential as a source for natural health products [Neeraj Verma, Anil P Singh, Amresh Gupta, PK Sahu, Ch V Rao* (Department of Pharmacology, Pharmacognosy and Ethnopharmacology Division, National Botanical Research Institute (Council of Scientific and Industrial Research), Rana Pratap Marg, Lucknow, Uttar Pradesh, India), *Indian Journal of Pharmacology*, 2011, 43(6), 689-702].

*NPARR* 3(3), 2012-0319, *Anticonvulsant and muscle relaxant activity of the ethanolic extract of stems of Dendrophthoe falcata (Linn. f.) in mice*

To investigate the anticonvulsant and muscle relaxant activity of ethanolic extract of stems of *Dendrophthoe falcata* in mice. The ethanolic extract of stems of *D. falcata* (100, 300 and 500 mg/kg, p.o.) was studied for its anticonvulsant effect on maximal electroshock-induced seizures and muscle relaxant activity at the same dose level using rota rod and traction test in mice. The fresh stems of *D. falcata* were collected during the month of September 2009 from district Barabanki, U.P. The plant material
was authenticated by Dr. Tariq Husain (Scientist Herbarium), National Botanical Research Institute, Lucknow (reference no. 97307). Preliminary phytochemical analysis revealed presence of proteins, carbohydrates, glycosides, steroids, triterpenes, flavonoids, tannins and phenolic compounds. D. falcata ethanolic extract (DFEE) (100, 300 and 500 mg/kg, p.o.) significantly (P<0.001) inhibited seizures induced by MES, reduced the duration of Hind limb tonic extensor phase (HLTE) and a decline in motor coordination. The ethanolic extract possesses anticonvulsant activity and muscle relaxant activity [Pooja Sinoriya, R Irchhaiya, Bhawna Sharma, Gayatri Sahu and Santosh Kumar (Institute of Pharmacy, Bundelkhand University, Jhansi, Uttar Pradesh, India), Indian Journal of Pharmacology, 2011, 43(6), 710-713].

NPARR 3(3), 2012-0320, Aqueous extract of Annona squamosa (L.) ameliorates renal failure induced by 5/6 nephrectomy in rat

To assess the renoprotective activity of the water extract of Annona squamosa in 5/6 nephrectomized animals. For evaluating the renoprotective effects of A. squamosa, 5/6 nephrectomized rats were used as a model for renal failure. The effects of hot-water extract of leaves of A. squamosa L. at a dose 300 mg/kg bw on biochemical and urinary parameters like plasma urea, plasma creatinine, and urine creatinine were analyzed. For elucidating its effect on oxidative stress, renal superoxide dismutase (SOD) levels were measured. Leaves of A. squamosa were collected during December 2009 from Visnagar, Gujarat. These were washed with water and 50 g of fresh leaves (kept at 25°C for 5 days in absence of sunlight) were extracted in 1 l of boiling water for 2 h and concentrated to half of the volume by boiling in a water bath. The dark-brown extract thus obtained was cooled, filtered using Whatman No. 1 filter paper, and the filtrate was centrifuged at 10,000 rpm at 25°C. The supernatant was concentrated up to 100 ml on rotavapour under reduced pressure. The lyophilized concentrated crude extract was used for the study. Nephrectomized rats (5/6) showed a significant rise in plasma urea and creatinine levels with a stable fall in urine creatinine. Treatment with A. squamosa extract (300 mg/kg bw) lead to a significant fall in the plasma urea and creatinine values with partial restoration to normal values along with a significant rise in the activity of SOD. Thus, therapeutic strategies against oxidative stress could be effective in renal diseases. This study provides an indication to investigate further the efficacy of A. squamosa as a novel agent for alleviating renal failure [Aaishwarya B Deshmukh and Jayvadan K Patel*(Department of Pharmacology, Nootan Pharmacy College, Visnagar- Gujarat, India), Indian Journal of Pharmacology, 2011, 43(6), 718-721].