ABSTRACT

The main objective of the present research work is the study of phytochemical, *in vitro* antioxidant and pharmacological effects of nutritional and medicinally potential plants which are freely available in the entire world. Intensive survey was done to identify the unexplored plants with main attention on alleviatory effects of plants against sodium fluoride (NaF) induced toxicity. Based on literature survey, the plants *Brassica oleracea* Var. *Botrytis* leaves and *Arthrospira platensis* were selected for investigation due to their potential alleviatory effects against NaF induced toxic effects.

Hydroalcoholic extracts of *Brassica oleracea* Var. *Botrytis* leaves and *Arthrospira platensis* were obtained by maceration process by using various ratios of water and ethanol (50:50, 30:70 and 70:30 respectively). Based on percentage yield, 30:70 ratio extracts of *Brassica oleracea* Var. *Botrytis* leaves (BOB) and *Arthrospira platensis* (ASP) were selected and preliminary phytochemical studies, *in vitro* antioxidant assays and alleviatory effects against NaF induced toxic effects were done. The phytochemical screening of the BOB and ASP were found to be consisting of the secondary metabolites - alkaloids, glycosides, steroids, flavonoids, phenols and tannins.

The various antioxidant ability assays such as 1,1-diphenyl-picrylhydrazyl (DPPH) radical scavenging assay, 2,2′-Azino-bis (3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt (ABTS) radical scavenging ability assay, metal chelation assay, total antioxidant assay and reducing power assay and non-enzymatic antioxidants such as total flavonoid content and total phenol content were performed. The results of the *in vitro* studies clearly concluded that the crude extracts of the BOB and ASP possess good free radical scavenging and antioxidant activity. ASP possessed greater DPPH radical scavenging ability, metal cheating ability, total antioxidant activity, reducing power ability, total flavonoid content and total phenol content but lesser ABTS radical scavenging ability than BOB. These *in vitro* results were supported by *in vivo* antioxidant potential of the hydroalcoholic extracts against NaF induced toxicity.

Acute toxicity studies of BOB and ASP showed that both extracts were well tolerated up to dose of 2000 mg/kg. Therefore 1/20th, 1/10th and 1/5th doses were selected for pharmacological evaluation against NaF induced toxicity.
In the treatment protocol, total thirty-six male wistar albino rats were randomly divided into six groups of six animals in each. Group I served as the normal control. Group II served as toxic control. Group III and IV served as plant control groups, received BOB and ASP at a dose of 400 mg/kg b. wt, Group V, VI and VII served as treatment groups received BOB at three doses 100, 200, and 400 mg/kg b. wt respectively and Group VIII, IX and X served as treatment groups received ASP at three doses 100, 200, and 400 mg/kg b. wt respectively. All groups except Group I, III and IV received NaF (100 ppm) through drinking water for 30 days. After end of the study, serum profiles such as thyroid biomarkers (T3 and T4), cardiac biomarkers (LDH, CK-MB), liver biomarkers (SGOT, SGPT, D & T bilirubin, total protein and albumin), lipid profile (total cholesterol, triglycerides and HDL-C), kidney biomarkers (BUN, uric acid and creatinine), complete blood profile and bone parameters (serum ALP, calcium and phosphorus and bone weight, breaking strength and bone fluoride level) and lipid peroxidation, reduced glutathione and catalase enzyme levels were measured in homogenates of heart, liver and kidney. Results of the present study clearly revealed that serum profiles of heart, liver, kidney and bone and complete blood profile and bone parameters are normalized in a dose dependent manner. Histopathological studies of heart, liver and kidney also further strongly supported the potential positive effects of BOB and ASP.

In conclusion, the present work clearly demonstrated the beneficial effects of Brassica oleracea Var. Botrytis leaves and Arthrospira platensis against NaF induced toxicity.

Key words: Sodium fluoride, Brassica oleracea Var. Botrytis leaves, Arthrospira platensis, Antioxidant, Thyroid profile, Cardioprotective, Hepatoprotective, Nephroprotective, Blood profile.