ABSTRACT

Herbal medicines play an important role in health care programmes all over the world especially among people of rural communities. This is because these ethnobotanical medicines are mostly accessible and affordable. They are used for treatment of various diseases on large scale. Although plants used traditionally are widely assumed to be safe, many are potentially toxic if not used properly. As a consequence, there is an increasing need to study and provide scientific rationale for the toxic effects of the medicinal plants. In the present work a survey was carried out in Manipur, a North-eastern state of India for the collection of ethnobotanical plants. The indigenous knowledge of local traditional uses was collected through personal interviews during the field survey from the traditional medicine practitioners and other experienced persons having knowledge on many useful plants. Based on the above survey, a data comprising of 24 plant species having medicinal & toxic properties and other uses representing 16 families has been reported. Datura stramonium L., Albizia myriophylla Benth. and Melia azaderach L. are three plants which are found to be used in various medicinal practices and for other several purposes. The potential neurotoxic effect of these three plants were evaluated using male albino mice. The neurotoxicity of aqueous extract of D.stramonium leaves, A.myriophylla bark and M.azedarach fruit were determined using neurobehavioral paradigms, biochemical assays and ultrastructural examination of the mice brain. The plant extracts were also assessed for the detection of the presence of phytochemical constituents. In addition the aqueous extracts of D.stramonium have been studied for antimicrobial activity against Bacillus subtilis, Pseudomonas aeruginosa and Klebsiella pneumoniae. MK-801(Dizocilpine), an antagonist of N-methyl-D-aspartate (NMDA) receptor was used in the present study. The role of MK-801 against the neurotoxicity induced by the plant extracts was evaluated. The neurobehavioral studies include locomotor activity test, elevated plus maze test, hole-board test, open field test and forced swimming test. Catalase, lactate dehydrogenase, glutamate dehydrogenase, glutamate oxaloacetate transaminase and glutamate pyruvate transaminase activities were estimated in
biochemical assays. The cerebral cortex of the mice treated with the plant extracts were subjected to transmission electron microscopic analysis and compared with that of the control animals. The results of the qualitative phytochemical screening showed the presence of alkaloids, tannins, saponins, phlobatannins, cardiac glycosides in *D.stramonium* extract, flavonoids, tannins, saponins, phlobatannins, cardiac glycosides in *A.myriophylla* and flavonoids, alkaloids, cardiac glycosides, terpenoids in *M.azedarach*. *D.stramonium* leaves aqueous extract was found to exert varying inhibitory effects in all the three mentioned strains of bacteria. The studies showed that all the plant extracts used in the present study were able to produce behavioral alterations. The results of the enzyme assays also revealed marked changes in the brain biochemical parameters. The transmission electron microscopic examination showed many abnormalities in the ultrastructure of the various cell organelles of the cerebral cortex. It was also found that MK-801 significantly attenuated the neurotoxicity caused by the plant extracts. In view of the above findings, we can conclude that *D.stramonium, A.myriophylla* and *M.azedarach* possesses neurotoxic characteristic and the various phytochemical constituents present in them might be responsible for its neurotoxicity. However, further studies will be necessary to clarify the mechanism of action and to characterize the exact principle components. The present work demonstrated the neurotoxicity of medicinal plants at specific doses and thus it can concluded that plants which are consumed as either medicinal herbs or for other uses should be properly processed and the adverse reactions from inappropriate or improper usage should be avoided. Moreover, it was also found that MK-801 showed neuroprotective effect against the neurotoxicity.