Pakistan Journal of Biological Sciences 9 (10): 1911-1916, 2006
ISSN 1028-8880

Mammal Toxicity and Mutagenicity Assessment of the Methanol Extract of the Molluscicidal Plant *Euphorbia schimperiana*

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Abstract: In this study, the toxic and mutagenic effects of *Euphorbia schimperiana*-methanol extract were investigated in Swiss albino mice of both sexes. In the course of a toxicological evaluation of this extract and prior to field applications, selected acute toxicity tests (oral, dermal, skin and eye irritation) were firstly determined. Then, three doses of acute oral (maximum, half maximum and double maximum) were chosen for the assessment of mutagenicity using the micronucleus test. While, the tested extract was slightly toxic non, irritant to the skin and moderately irritant to the ocular tissue it significantly increased the frequency of micro-nuclei particularly at the doubly maximum dose in both sexes. In conclusion, the results indicated that the *Euphorbia schimperiana*-methanol extract has slightly toxic effect. But has a potent mutagenic effect in mice.

Key words: *Euphorbia schimperiana*, toxicity, mutagenicity, micronucleus, molluscicidal

INTRODUCTION

During the past decades several important reviews on plant molluscicides have been published (Kloos and McCullough, 1982; Marston and Hostettmann, 1985; Mott, 1987). The introduction of these plants, or their parts as extracts, into the environment requires prior investigation of their possible toxic effects on mammals and certain other non-mollusc groups of invertebrates (Koeman, 1987). Although there has been much research on plant molluscicides, none has been used extensively in an endemic country, nor have there been consistent efforts to ensure adequate supplies of the candidate compounds for laboratory studies (WHO, 1993).

Lambert *et al.* (1991) reported that the extract of *phytolacca dodecandra* was either slightly toxic or non-toxic, but the extract did, however, prove to be a severe eye irritant. On the other hand, Alard *et al.* (1991) mentioned that *Ambrosia maritima* is virtually non-toxic to aquatic and other non-target organisms. Also, Brackenbury *et al.* (1997) classified the effect of *Apodytes dimidiata* extracts as non-toxic and non-irritating. More recent tests on mice have shown that lethal doses of same plant extract are much higher the LD90 detected for snails (Mattos *et al.*, 1989). Low toxicity for the skin and eyes of rabbits was also demonstrated by using the same plant extract (Freitas *et al.*, 1991).

In addition, the micronucleus (MN) assay has been commonly used as a predictor of genotoxicity. It involves the enumeration of micronuclei in enucleated polychromatic erythrocytes (PCEs) obtained from bone marrow samples. MN are formed by condensation of chromosome fragment or whole chromosomes that are not induced in the main nucleus following anaphase (Heddle *et al.*, 1983). Two reports on the genotoxicity (mutagenicity) of other species of *Euphorbia*. Zamith *et al.* (1996) stated that the latex *E. millii* var. *hislopii*, syn. *E. splendens* var. *hislopii* had no effect on frequencies of chromosome aberrations in the bone marrow of male and female rats at a does of 1000 mg kg^{-1}. Latex was also investigated for its capability of inducing gene mutation and chromosome aberrations in V79 cells *in vitro* in the absence or presence of S9 mix. They also found that at concentrations up to 800 mg mL^{-1} neither induced gene mutations at HPRT locus nor chromosome aberrations. These result indicated that the latex of *E. milli* is not mutagenic in mammalian cells *in vitro*, or *in vivo* and its use as a molluscicide does not pase a mutagenic hazard for human. The second report concluded that the highly oxygenated diterpene was not mutagenic toward *Salmonella typhimurium* strain TM677 either in the presence or absence of a metabolic activating system (Shamon *et al.*, 1997).

Biologists have been recommended to adhere to the toxicity tests laid down in the minimal data requirements of the Organization of Economic Cooperation and Development (OECD) Guidelines for pre-market chemicals (Lambert *et al.*, 1991; Brackenbury *et al.*, 1997). However, in order to test the applicability of local varieties of *Euphorbia schimperiana* in schistosomiasis intervention

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