

Safety evaluation of Sri Lankan *Piper betle* leaf extracts in rats

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Abstract : The aim of this study was to evaluate the safety profile of cold ethanolic extract (CEE) and hot water extract (HWE) of Sri Lankan *Piper betle* Linn. leaves (Family: Piperaceae). The extracts were orally administered to rats for 42 consecutive days. These rats were monitored for overt signs of toxicity, stress, morbidity, aversive behaviors or mortality throughout the experiment. Weight gain, food and water intake were determined weekly. On day 1 post treatment, the rats were sacrificed, blood collected and organs were weighed. The results showed that both extracts were well tolerated in terms of % weight gain, food and water intake, morbidity, aversive behaviors, mortality, blood haematology, serum analysis and organ weights except the weight of the spleen, which suggested lymphoproliferative activity.

Keywords : *Piper betle*, toxicity, spleen

INTRODUCTION

Piper betle Linn. (Family: Piperaceae) is a perennial dioecious, semiwoody climber, stems strongly swollen at the nodes, papillose when young, soon entirely glabrous when mature, leaves alternate, simple yellowish green to bright green in color. *Piper betle* is cultivated in Sri-Lanka, India, Malaysia, Indonesia, Philippine Islands and East Africa (Jayaweera, 1982, Dassanayake and Fosberg, 1987). More than 12 *Piper betle* cultivars / types which show minor morphological differences are reported in Sri Lanka (Rathnasoma and Senevirathna , 1995) whereas in India more than 100 types / cultivars (Sharma et. al., 1983) are reported. The use of betel leaves can be traced as far back as two thousand years. It is described in the most ancient history book of Sri Lanka Mahavansa written in Pali (DEA ,1997).

Studies have shown that betel leaves contain tannins, sugar, carotenes, ascorbic acid and an essential oil. The essential oil is bright yellow to dark brown liquid possessing a clove like flavor and consists of terpenes and phenols. Moreover, relative proportions of the chemical constituents vary among different varieties of *Piper betle* (CSIR, 1969). The studies indicated that chemical constituents of essential oils of all cultivars / types found in Sri Lanka are similar except the betel type / cultivar called Malabulath, which is not used for chewing. The constituents of the essential oil of commercial betel of Sri Lanka are different of those reported in Indian types / cultivars (Arambewela, 1999). Both in India and Sri Lanka, *Piper betle* leaves are used for chewing and credited with many medicinal properties such as digestive, carminative and aphrodisiac. Further, it is given to children for cough and

administered to the eye for night blindness in adults. The juice of the leaves is given for catarrh and diphtheria. The leaves are applied to purulent ulcers (Jayaweera , 1982 , Dassanayake and Fosberg , 1987) However, it is recorded that Sri Lankan betel inhibits male sexual behavior in rats (Ratnasooriya and Premakumara, 1996).

The ethanolic extract of *Piper betle* leaf-stalks found in India was reported to be non toxic as judged by haematological, bio-chemical profiles and enzymatic studies (Sengupta et, al., 2000). Due to the various compounds present in commercial betel of Sri Lanka attempts are now being made to develop value added products. However, as yet, toxicity of Sri Lankan *Piper betle* has not been investigated. Thus, the aim of this study was to evaluate the toxicity of *Piper betle* leaves commercially used in Sri Lanka for chewing, export and development of value added products such as herbal cosmetics , antioxidants, toothpastes etc. This was done using hot water and cold ethanolic extracts of betel leaves in rats.

MATERIALS AND METHODS

Plant material

Fresh *Piper betle* leaves were purchased from major vegetable markets in Narammala, Matale, Galle, Rathmalana and Kandy districts of Sri Lanka in March 2002. The leaves were identified and authenticated by Dr. H.A.Rathnasoma at Betel Research Institute, S

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