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Clinical Aspects of Some Plants Used in the Treatment of Snakebites

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ABSTRACT

The leaf extract of Veronica anagallis-aquatica (SCROPHULARIACEAE), Leonurus sibiricus (LAMIACEAE), Achyranthes aspera (AMARANTHACEAE) and Vitex negundo (VERBENACEAE) were used to counteract snake venom activity. The respective plants are used either single or in combination as antidotes for snake envenomation.

1. Introduction

From the time immemorial, man has been dependent on nature for survival. This dependency led the aboriginal people living in harmony with nature to evolve an unique system of knowledge about plant wealth by trial and error methods. Traditionally, this treasure of knowledge has been passed on orally from generation to generation without any written document (Perumal Samy and Ignaciumuthu, 1998, 2000).Indigenous and certain local communities practise herbal medicine to cure a variety of diseases including snakebites (Siddiqui and Hussain, 1990; Martz,1992; Houghton and Osibogun,1993).

Snakebite is a serious medical, social and economic problem in many parts of the world. Envenomations due to snakebites are commonly treated by parental administration of horse or sheep-derived polyconal antivenoms aimed at neutralization of toxins.Traditional herbal medicine is readily available in rural areas for the treatement of snakebite. Application of the plant or its sap onto the bite area, chewing leaves or drinking plants extracts are some procedures intended to counteract snake venom activity. Plants are used either single or in combination, as an antidotes for snake envenomation. Plants are reputed to neutralize the action of snake venom, with a plethora of plants (Kirtikar and Basu, 1975).

Phytochemical agent like flavonoids inhibits snake venom phospholipase A2 activity (Alcaraz and Hoult, 1985). Flavonoid glycoside rutin is also effective in increasing survival of rats injected with cobra venom (Gujral and Dhawan, 1956).

Hence, several substances have been isolated from plants and tested against the lethal action of the venoms (Mors *et al.,* 1989; Pereira *et al*., 1994). As a result, a large number of plants have been found to be effective as antidotes against snake venoms (Chopra *et al.,* 1956; Usher, 1974; Kirtikar and Basu, 1975; Nadkarni, 1976; Lewis and Elvin-Lewis, 1977; Alam and Gomes, 2003). However, in most cases the efficacy of this traditional treatment regimen is unproven. Thus, the study of herbal antidotes against snake venom is of great importance in the management of snakebite. There are few survey reports, that reveal the practice of herbal medicine by folk communities (Bhandary *et al.,* 1956; Harsha *et al*., 2002, 2003; Parinitha *et al.,* 2005). Hence, the present study is focused on the preliminary survey of medicinal plants like *Veronica anagallis-aquatica* (SCROPHULARIACEAE), *Leonurus sibiricus* (LAMIACEAE), *Achyranthes aspera* (AMARANTHACEAE) and *Vitex negundo* (VERBENACEAE) for therapeutic application of snakebite.

2. Materials and methods

Plants like *Veronica anagallis-aquatica* (SCROPHULARIACEAE), *Leonurus sibiricus* (LAMIACEAE), *Achyranthes aspera* (AMARANTHACEAE) and *Vitex negundo* (VERBENACEAE) were collected from our area. Two hundred grams of each shads dried leaves of all plants were dissolved in 800 ml distilled water at room temperature. The extracts were filtered by sterile muslin cloth and concentrated by using lyophilization to obtain aqueous residue. The extract was kept in stoppered bottle, and then stored at 4°C for in vivo testing of antidote in animal model. (Brantner and Grein, 1994). The portion of the aqueous extract that was subjected to phytochemical screening was used for identification of secondary metabolites (Harborne, 1976). The different chemical constituents tested include alkaloids, gallic acids, aglycones, triterpenes etc. Five grams of used antisnake venom plant extracts were dissolved in methanol and then centrifuged for 25 minutes. The residue was placed on top of the silica gel column and eluted with petroleum ether : Chloroform (8:2, 3:1, 2:1). Chloroform : methanol (85:15, 80:20, 90:10). The fractions were evaporated to dryness and lested for venom neutralization in experimental animals.

Snake venom : Lyophilized snake venom was purchased and stored in a refrigerator at 4°C until further use. The venom was dissolved in 0.9% saline and centrifuged at for 15 minutes. The venom concentration was expressed in term of dry weight (mg/ml).

Animals : Animals were purchased and experiments were carried out in accordance with the guidelines.

3. Results and discussion

The survey of 4 plants to be employed in the treatment of snakebite represents 4 families of flowering plants i.e. AMARANTHACEAE, SCROPHULARIACEAE, LAMIACEAE and VERBENANCEAE. The bitter tastes of leaves are used for prognostic purposes. If the plant material tastes bitter, the patient is judged free from danger, but if the materials are sweet to the taste, the patient needs urgent medical attention. Dosages are repeated until the taste returns to normal.

Sometimes, especially when a patient cannot open his/her mouth, the juice of the plant is administered through nostrils or eyes, or applied liberally to the head (Anandan and Veluchamy, 1986; Anuradha et al., 1986). A strict and complete dietary schedule for swelling, nausea, pain and other effects during and after recovery is followed to promote a thorough cure (Whitaker, 1978). Neutralizing effect of venom by crude extracts :

The prepared extracts were independently administered orally to mice after S.C. venom injection measuring 2.5 µg. The prepared extracts were found to neutralize the venom.

The present investigation proved that extract prepared from *Veronica anagallis-aquatica* (SCROPHULARIACEAE), *Leonurus sibiricus* (LAMIACEAE), *Achyranthes aspera* (AMARANTHACEAE) and *Vitex negundo* (VERBENACEAE) possess snake venom neutralizing potential which may be due to their phytochemical constituents. Several chemical constituents like alkaloids, flavonoids, glucoside, lupeol, phenolics, pentacyclic triterpenes like aleanoic acid, ursolic, tannins, α and β amyrin are found to be present in varying proportions. All these classes of chemical compounds are capable of interacting with macromolecular targets (enzymes or receptors) and can effectively inhibit the toxic effect of snake venom *in vitro* than *in vivo* (Berges *et al*., 2005).

The above observations confirmed that the plant extracts of the leaves of *Achyranthes aspera*, *Veronica anagallis-aquatica*, *Leonurus sibirius* and *Vitex negundo* possess potent snake venom neutralizing.

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