ABSTRACT

Herbal medicines remain the major source of health care for the world’s population, WHO has recognized herbal medicine as an essential building block for primary health care. As India is a tropical country which is still in a developing stage, snakebite is a major problem to be concerned. In present article an endeavour has been made to explain the medicinal plants that are either used as tribal/traditional medicines or has already been proved to be useful in the treatment of venomous snakebites with a special emphasis on the isolated phytocompounds responsible for anti-venom activity.

Keywords: Snakebites, anti-venom activity, phytocompounds, tribal medicines.

INTRODUCTION

Snake bite remains a public health problem in many countries even though; it is difficult to be precise about the actual number of cases. It is estimated that the true incidence of snake envenomation could exceed 5 million per year. About 1,00,000 of these develop severe squeal. The global disparity in the epidemiological data reflects variations in health reporting accuracy as well as the diversity of economic and ecological conditions. Accurate records to determine the exact epidemiology or even mortality of snake bite cases are generally unavailable. Hospital records fall far short of the actual number, owing to dependence on traditional healers and practitioners of witchcraft, especially in developing countries. It has been reported that in most developing countries, up to 80% of individuals bitten by snakes first consult traditional practitioners before visiting a medical centre. Owing to the delay, several victims die during journey to the hospital.[1-3]

Envenoming by snakes such as Vipera russelli and Naja naja are responsible for several clinical complications of severe systemic and local pathology. For example; Vipera russelli lead to inflammation (such as swelling, blistering and necrosis) and haemorrhages due to some active enzymes. On the other hand envenoming by Naja naja induced clinical complications differ from that caused by Vipera russelli. These include
neurotoxicity, local necrosis, haemorrhage, complement depletion and respiratory arrest or paralysis. Moreover, the venom of the *Naja naja* consist of phospholipase A2 (an anticoagulant enzymes which inhibit the prothrombinase complex by its binding to coagulation factor Xa). Furthermore, in some cases envenoming by *Naja naja* can induce corneal ulceration. Although, an intravenous administration of anti-venom, prepared from IgG of venom immunised horses or sheep, is an effective treatment for systemic envenoming, the clinical consensus is that anti-venom is of limited effectiveness against the effects of local envenoming that develop rapidly after a bite. Such effects include severe pain, oedema, localized haemorrhage and necrosis which often results in permanent scarring and deformity. The ineffectiveness of anti-venom in treating local envenoming has been attributed to the rapid activity of the toxins and the inability of anti-venom IgG to cross the blood/tissue barrier. Despite their smaller size Fab fragments of IgG are also ineffective against the local effects of envenoming, whether administered by intravenous or intramuscular routes. Research to develop a treatment for local envenoming is therefore a clinical priority and has focused on the application of natural or synthetic inhibitors of snake venom. The use of plant remedies to treat snakebite victims in rural areas and poor communities in the developing countries is a common practice. The natives who are predominantly rural farmers come in contact with snakes during their farming engagements. Due to high cost of hospital treatment and unavailability of anti-venoms, most often the rural people find it more convenient to consult native doctors who are acclaimed for curing snakebite patients. This evidence indicates that plant remedies used by the native doctors are effective, and there appears to be a high rate of survival among snakebite patients advanced clinical stages of venom toxicity [1-5].

A look at this section of the review describes how an ambitious patient lands up in the hands of traditional practitioners after the occurrence of snakebite; also an endeavour has been made to present the impact of various herbal allies that are generally used in the snakebite envenomation.

**Assessment of Anti-venom activity** [2,3,6,8,9]:

Anti-venom activity can be accessed by using different in vivo as well as in vitro models such as,

**In vitro models:**
1. Phospholipase activity
2. Procoagulant activity
3. Fibrinolytic activity
4. Proteolytic activity
5. Hyaluronidase activity

**In vivo models:**
1. Determination of Lethal Toxicity
2. Haemorrhagic activity
3. Defibrinogenating activity
4. Edema forming Activity
5. Myonecrotic activity

Herbal Allies useful in the treatment of Snakebite envenomation\(^{[1-9]}\):

**TABLE-I DIFFERENT PLANTS THAT ARE USED TRADITIONALLY AND/OR TRIBALLY IN THE SNAKEBITE TREATMENT**

<table>
<thead>
<tr>
<th>Plant</th>
<th>Family</th>
<th>Part used</th>
<th>Tribe used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anisomeles malabarica</td>
<td>Lamiaceae</td>
<td>Leaves</td>
<td>in Kerala</td>
</tr>
<tr>
<td>Boerhavia diffusa</td>
<td>Nyctaginaceae</td>
<td>Root</td>
<td>-</td>
</tr>
<tr>
<td>Calycopteris floribunda</td>
<td>Combretaceae</td>
<td>Root</td>
<td>-</td>
</tr>
<tr>
<td>Celastrus paniculatus</td>
<td>Celastraceae</td>
<td>Crushed stem bark</td>
<td>in Rajasthan</td>
</tr>
<tr>
<td>Costus speciosus</td>
<td>Costaceae</td>
<td>Root</td>
<td>-</td>
</tr>
<tr>
<td>Cyperus rotundus</td>
<td>Cyperaceae</td>
<td>Stem</td>
<td>in Rajasthan</td>
</tr>
<tr>
<td>Helecteres isora</td>
<td>Sterculiaceae</td>
<td>Root and Seeds</td>
<td>-</td>
</tr>
</tbody>
</table>
Plants used against snake bite in India:

- Plants reducing the symptoms
  - e.g. Rauwolfia serpentina and Gymnema sylvestre
- Plants that repel snakes
  - e.g. Garlic and Garlic vine
- Immune system stimulants
  - e.g. Aristolochia species
- Plants with analgesic anti-inflammatory activity
  - e.g. Rhapidophora pertusa (Araceae) and Azadirachta indica

Phytocompounds responsible for Anti-venom activity:

- Gymnemic acid (triterpenoid glycoside) from Gymnema sylvestre is used as a remedy for snake bite in India.
- Eclipta prostrata extracts inhibit effects of South American rattle snake bite. Three active compounds, coumestan, wedelolactone and sitosterol have been isolated from the crude extract of this plant.
- The tannin from Diospyros perigrina inhibits swelling caused by sea snake venom.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Family</th>
<th>Part Used</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocimum sanctum</td>
<td>Labiatae</td>
<td>Leaves</td>
<td>in Kerala</td>
</tr>
<tr>
<td>Oxalis corniculata</td>
<td>Oxalidaceae</td>
<td>Whole plant</td>
<td>in Orissa</td>
</tr>
<tr>
<td>Pittosporum neelgherrense</td>
<td>Pittosporaceae</td>
<td>Stem bark</td>
<td>Kani and Malapandaram</td>
</tr>
<tr>
<td>Plumbago zeylanica</td>
<td>Plumbaginaceae</td>
<td>Leaf</td>
<td>in Orissa</td>
</tr>
<tr>
<td>Rhinacanthus nasuta</td>
<td>Acanthaceae</td>
<td>Leaves and Roots</td>
<td>traditional healers of Kerala</td>
</tr>
<tr>
<td>Santalum album</td>
<td>Santalaceae</td>
<td>Heartwood</td>
<td>in Kerala</td>
</tr>
<tr>
<td>Strychnus nux vomica</td>
<td>Loganiaceae</td>
<td>Seeds and Roots</td>
<td>in Orissa</td>
</tr>
<tr>
<td>Tragia involucrata</td>
<td>Euphorbiaceae</td>
<td>Root</td>
<td>in Orissa</td>
</tr>
</tbody>
</table>
Curcuma longa rhizomes (Zingiberaceae) are used to treat snake bite. Turmerone from C. longa afforded protection against the lethal effect of the venom of Bothrops jararaca.

Atropine, from Atropa belladona, the deadly nightshade (Solanaceae) protects against the toxins from the green and black mamba.

CONCLUSION

It may be concluded that evidence are now available to establish the scientific background of the traditional use of plants against snake bite. Thus, medicinal plants with anti-venom activity could be considered as an effective alternative to mammalian antibody production for the treatment of snakebite en-venomation.

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