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A study on the role of holy basil (*Ocimum sanctum*) in auto-healing of Indian garden lizard (*Calotes versicolor*)

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Abstract

The present communication is a firsthand observation indicating the innate faculty of recognition of healing potential of wild herbs by Indian garden lizard (*Calotes versicolor*). It testimonies the age old therapeutic property of holy basil plant (*Ocimum sanctum*) as: anti-inflammatory, analgesic, antipyretic, antiseptic, anticonvulsant, and anti-spasmodic properties on one hand and the ability of garden lizard to recognize these properties on the other hand. Since, most of the observations of such kind are mainly confined to primates and very little work has been done on other groups of animal, this observation is therefore, important in filling the lacuna of knowledge in the field of zoopharmacognosy related to reptiles. The findings further indicate that besides primates, reptiles also have great sense to search the medicinal plants for self-medication during emergency and diseases.

Keywords: Indian garden lizard, reptiles, holy basil, Zoopharmacognosy, self-medication

1. Introduction

In the first sight, the self-healing of wild animals with herbs appears to be romantic anthropomorphism. However; it has been documented in folklores, legends, mythology, and traditions that wild animals heal themselves with the herbs present around. Although traditional medicines lay claims to such feats of self-medication by animals, yet until recently, the scientists have been reluctant to accept these facts, dismissing them as quixotic stories. However, the things are changing as more and more scientific evidences are coming into limelight that insects, birds and mammals heal their sickness through self-medication. Monkeys, bears, coatis and birds protect themselves from insect bites and fungal infections by rubbing medicinal plants and insects into their skin. Chimpanzees carefully select anti-parasitic medicines to deal with parasites. Elephants roam miles to find the clay they need to help antagonize dietary toxins. And birds line their nests with pungent medicinal leaves so as to improve the health and ensure chances of survival of their chicks.

Growing scientific evidence indicates that animals do have knowledge of natural medicines. In fact, they have access to the world's largest pharmacy, the nature itself. Zoologists and botanists are only just beginning to understand how wild animals use plant medicines to prevent and cure their illness. There are several instances of self-medication by wild animals^[1-5]. Humans weren't the first to use plants for medicine but other animals also do this by their health concerns. This behavior of animals is well recognized now as zoopharmacognosy, a new field in science for the discovery of new drugs. The term zoopharmacognosy was coined by Eloy Rodriquez in 1987. Zoopharmacognosy recognises the innate ability of animals both domesticated and wild to know what they need to restore them to health^[6].

Now days, anthropologists, ecologists, ethologists, ethnobiologists, botanists and zoologists monitor the wild animals observing when an animal is sick, not only for the knowledge of the plants they choose but also, which part of the plant is used and how much is taken during the course of their self-medication. Animals are very meticulous in their self-medicating and only choose exactly what they need. However, most of the observations are mainly confined to primates and very little work has been done on other groups of animal, this observation is therefore, important in filling the lacuna of knowledge in the field of zoopharmacognosy related to reptiles.

2. Material and methods

2.1 *Calotes versicolor* (Daudin)

The Oriental Indian Garden Lizard, (*Calotes versicolor*) is an agamid lizard found widely distributed in Asia including Iran, Afghanistan, Pakistan, Nepal, Bhutan, India, Sri Lanka,

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Myanmar, Thailand, Western Malaysia, Maldives, Vietnam, Pulo Condore Island, South China, Indonesia, Mauritius. It has been introduced to Oman, Singapore, and United States and other parts of the world [7].

Two small groups of spines perfectly separated from each other, above each tympanum. Dorsal crest moderately elevated on the neck and anterior part of the trunk, extending on to the root of the tail in large individuals, and gradually disappearing on the middle of the trunk in younger ones. No fold in front of the shoulder, but the scales behind the lower jaw is much smaller than the others; gular sac not developed. From thirty-nine to forty-three series of scales round the middle of the trunk. The hind foot (measured from the heel to the extremity of the fourth toe) is not much longer than the head in the adult, whilst it is considerably longer in the young. The coloration is very variable, sometimes uniform brownish or grayish-olive or yellowish with broad brown bands across the back, interrupted by a yellowish lateral band. Black streaks radiate from the eye, and some of them are continued over the throat, running obliquely backwards, belly frequently with grayish longitudinal stripes, one along the median line being the most distinct; young and half-grown specimens have a dark, black-edged band across the inter-orbital region. The ground-colour is generally a light brownish olive, but the lizard can change it to bright red, to black, and to a mixture of both. This change is sometimes confined to the head, at other times diffused over the whole body and tail. A common state in which it may be seen (as stated by Mr. Jerdon) is, seated on a hedge or bush, with the tail and limbs black, head and neck yellow picked out with red, and the rest of the body red. Jerdon and Blyth agree that these bright, changeable colours are peculiar to the male during the breeding-season, which falls in the months of May and June. Mouhot has collected in Siam one of those fine variations of colours, which, however, appear to be infinite. It has the usual cross streaks between the eyes and the radiating lines continent of India to China; it is very common in Ceylon, not extending into the temperate zone of the Himalayas. Ceylonese specimens are generally somewhat larger; one of them measured 16 inches, the tail taking 11 inches. It is found in hedges and trees; it is known in Ceylon under the name of "Bloodsucker," a designation the origin of which cannot be satisfactorily traced; in the opinion of Kelaart, the name was given to it from the occasional reddish hue of the throat and neck. The female lays from five to sixteen soft oval eggs, about 5/8ths of an inch long, in hollows of trees, or in holes in the soil which they have burrowed, afterwards covering them up. The young appear in about eight or nine weeks. In a hot sunny day a solitary Bloodsucker may be seen on a twig or on a wall, basking in the sun, with mouth wide open. After a shower of rain numbers of them are seen to come down on the ground and pick up the larva and small insects which fall from the trees during the showers [8-11].

2.2 Holy basil (*Ocimum sanctum* Linn.)

Ocimum sanctum Linn. (family-Lamiaceae), commonly called as *Tulsi* is an erect, much branched sub-shrub 30-60 cm tall, with simple opposite green or purple leaves that are strongly scented and hairy stems. Leaves have petiole and are ovate, up to 5 cm long, usually somewhat toothed. Flowers are purplish in elongate racemes in close whorls. It is native to the world tropics and widespread as a cultivated plant and an escaped weed. It is cultivated for religious and medicinal

purposes and for its essential oil. It is also an important symbol in many Hindu religious traditions, which link the plant with Goddess. The name '*Tulsi* in Sanskrit means 'the incomparable'. The presence of a *Tulsi* plant symbolizes the religious bend of a Hindu family, as it is considered a sacred plant in Hinduism.

It has been used for thousands of years in Ayurveda for its diverse healing properties. *Tulsi*, the Queen of herbs, the legendary 'Incomparable one' of India, is one of the holiest and most cherished of the many healing and health giving herbs of the orient. The sacred basil, *Tulsi*, is renowned [12] for its religious and spiritual sanctity, as well as for its important role in the traditional Ayurvedic and Unani system of holistic health and herbal medicine of the East. It is mentioned by Charaka in the Charaka Samhita; an Ayurvedic text. *Tulsi* is considered to be an adaptogen, balancing different processes in the body, and helpful for adapting to stress. Marked by its strong aroma and astringent taste, it is regarded in Ayurveda as a kind of 'elixir of life' and believed to promote longevity. *Tulsi* extracts are used in Ayurvedic remedies for common colds, headaches, stomach disorders, inflammation, heart disease, various forms of poisoning and malaria. Traditionally, *O. sanctum* is taken in many forms, as herbal tea, dried powder or fresh leaf. For centuries, the dried leaves of *Tulsi* have been mixed with stored grains to repel insects [13].

Compounds isolated from *O. sanctum* extract, Cissiloneol, Cissimavatine, Isothymonin, Apigenin, Rosavinic acid and Eugenol were observed for their anti-inflammatory activity [14] or cyclooxygenase inhibitory activity. Eugenol demonstrated 97% cyclooxygenase-1 inhibitory activity when assayed at 1000 μ M concentration (pn). Cissiloneol, Cissimavitin, Isothymonin, Apigenin and Rosavinic acid displayed 37, 50, 37, 65 and 58% cyclooxygenase-1 inhibitory activity, respectively, when assayed at 1000 μ M concentrations. The activities of these compounds were comparable to Ibuprofen, Naproxen and aspirin. [15] reported that linoleic acid present in different amount in the fixed oil of different species of *O. sanctum* has the capacity to block both the cyclooxygenase and lipooxygenase pathways of arachidonate metabolism and could be responsible for the anti-inflammatory activity. Similarly, [16] reported that methanolic extract and aqueous suspension of *O. sanctum* (500 mg/kg) inhibited acute as well as chronic inflammation in rats. Both the extract and suspension showed analgesic and antipyretic activity in mouse, comparable to 300 mg/kg sodium salicylate. [17] Found anticonvulsant potential in holy basil. [18] Evaluated the wound healing effect of aqueous extract of *O. sanctum* in rats. These pharmacological studies have established a scientific basis for therapeutic uses of this plant as, anti-inflammatory, analgesic, antipyretic, antiseptic, anticonvulsant, and anti-spasmodic properties.

3 Observations

On 6th of September 2015, a female Garden Lizard, (*Calotes versicolor*) was found severely injured in the lawn of the author at 6:20 pm (Indian time). The injured condition of the animal was marked by lethargic symptoms accompanied with exudating scratches in the body at places, erectile scales, withdrawn tail, semi-closed eyes, and almost unconscious state, hardly responding to any stimulus. However, it was observed moving either and thither at intervals, as if searching for something to get help. The author became interested in

this behaviour of the lizard and started to observe closely and silently. The lizard after visiting several plants of the lawn ultimately resorted on the apical tender part of the holy basil (*O. sanctum*) plant at 7:45pm (Fig.1A). It was interesting to note that the lizard did not leave the *O. sanctum* even after several stimuli employed by the author.

A periodic examination for about 12 hours of the animal-plant interactions between *C. versicolor* and *O. sanctum* by thorough vigil and recording of behaviour of the lizard, it was found to be healed physiologically marked by energy and tranquility accompanied with symptoms such as: decumbent scales, straight tail, fully opened moving eyes, state of activity, and quick response to stimuli. However, the scratch marks were intact but showing healing symptoms marked by semi-dried conditions. On 7th of September 2015 at 8:05am responding to a little stimulus on the tip of the tail, the fully active lizard approached to the nearby bushes and disappeared from the sight. The whole episode was captured in series of snaps (Fig. 1 A-F) for record.



3. Result and discussion

Wild animals often show remarkable talents for healing their own diseases, parasitic infections and injuries. If the chance favours, they demonstrate an evolutionary inner wisdom about their health needs. The above observation testimonies the traditional therapeutic uses of holy basil plant (*O. sanctum*) as, anti-inflammatory, analgesic, antipyretic, antiseptic, anticonvulsant, and anti-spasmodic properties on one hand and the ability of *C. versicolor* to recognize these properties on the other hand. The findings therefore indicate that besides primates, reptiles also have great sense to search the medicinal plants for self-medication during emergency and diseases. However, the potential of reptiles in

zoopharmacognosy needs to be extensively explored for the greater interest of science and society.

Early in the co-evolution of plant-animal relationships, some arthropod species began to utilize the chemical defences of plants to protect themselves from their own predators and parasites. It is likely, therefore, that the origins of herbal medicine have their roots deep within the animal kingdom. From prehistoric times man has looked to wild and domestic animals for sources of herbal remedies. Both folklore and living examples provide accounts of how medicinal plants were obtained by observing the behaviour of animals. Animals too learn about the details of self-medication by watching each other.

Since animals first roamed the planet they have had to develop their enzymatic physiology to cope with potential life threatening disease and injuries. In order to evolve into the animals we know today their ancestors developed a life sustaining solution for self-medication and dosage by using the materials they found in the natural habitat. These medicinal compounds are found in plants, roots, seeds, fruits, flowers, algae, clays etc. They are not food; these secondary compounds offer no obvious metabolic food value, no carbohydrates, starches, proteins. Secondary metabolites taste bitter and are unpalatable to a healthy animal and given the choice a healthy animal will choose not to eat them. For a sick animal they provide natural medicinal properties that can help them with their disease, stress or injuries, once the animal has recovered the use of secondary compounds stops and they return to primary compounds (foods) once again.

In light of the growing resistance of parasites and pathogens to synthetic drugs, the study of animal self-medication and ethno-medicine offers a novel line of investigation to provide ecologically-sound methods for the treatment of parasites using plant-based medicines in populations and their livestock living in the tropics ^[19].

4. Conclusion

The findings indicate that besides primates, reptiles also have great sense to search the medicinal plants for self-medication during emergency and diseases. However, the potential of reptiles in zoopharmacognosy needs to be extensively explored and pharmacologically authenticated for the greater interest of science and society.

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