



## Research Article

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### ETHNOBOTANICAL INVESTIGATIONS ON ANTIDOTES IN SINGHASON HILLS, KARBI ANGLONG DISTRICT, ASSAM, INDIA

Teronpi Ni-et<sup>1</sup>, Terangpi Reena<sup>1</sup>, Tamuli Ajit Kumar<sup>2</sup>, Teron Robindra<sup>3\*</sup>

<sup>1</sup>Research Scholar, Department of Life Science and Bioinformatics, Assam University- Diphu Campus, Karbi Anglong, DIPHU, Assam, India

<sup>2</sup>Associate Professor, Department of Life Science and Bioinformatics, Assam University- Diphu Campus, Karbi Anglong, DIPHU, Assam, India

<sup>3</sup>Assistant Professor, Department of Life Science and Bioinformatics, Assam University- Diphu Campus, Karbi Anglong, DIPHU, Assam, India

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#### \*Corresponding author

Dr. Teron Robindra, Assistant Professor, Department of Life Science and Bioinformatics, Assam University- Diphu Campus, Karbi Anglong, DIPHU, Assam, India E-mail: robin.teron@gmail.com

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#### ABSTRACT

The Singhason hill range in Karbi Anglong district, Assam, India is considered a floristic hotspot of Assam, India. The region has poor access to modern healthcare system and people rely on traditional medicine for primary healthcare. The present study investigates ethnomedicinal claims relating to treatment and management of plant poisons and venomous bites practised among the people in Singhason hills. Methods adopted for the present study included semi-structured interviews and personal observations. The present paper provides ethnomedicinal knowledge of 42 medicinal plants of 40 families, used as antidotes- food poisoning (6), insect and spider poisons (11), snake poison (17) and other poisons (13). Both herbal prescriptions as well as restrictions are maintained to manage many poisons and allergy reactions. Traditional medicines remain an integral part of healthcare; it can be developed through validation and value addition.

**Keywords:** Singhason hill, Karbi, poisons, bites, plant antidote

#### INTRODUCTION

The Singhason hills in Karbi Anglong district (25°30' to 26°36' N and 92°00' to 93°54' E) in Assam state, India comprises of the Singhason peak (1360 m) and the adjacent hills that also includes a few protected areas. The hill range with rich biodiversity is considered as one of the floristic hotspots of Assam, India. The region is located in the eastern part of Karbi Anglong district and the area is surrounded by the Rengma hills<sup>1</sup>. The hills abruptly rise through successive ranges to the north of the Jamuna River. On the east and west, it gradually slopes down to the neighbouring plains of Golaghat and Nagaon respectively, while to the north it reaches the Brahmaputra River through a low plateau surface. The Singhason hills were earlier inhabited by different ethnic groups like Karbi, Kuki, Rengma, Naga, Shyam, Hmar, Garo, Chakma and Tea-Tribes who have modified the habitat through agricultural and other practices since time immemorial, but due to recent ethnic tensions, the region is presently dominated by the Karbis. The people are largely dependent on agricultural products and forest resources for almost all requirements. Agriculture is the main occupation of the people which is practised by clearing the forest patch. Hunting and fishing are the secondary occupation. Agricultural products like paddy are not sufficient to last for the whole year and this necessitates the consumption of unconventional foods collected from forest habitats. The daily life of the people in the region demands frequent visits to the forest,

thereby, leading to the high probability of encountering with poisonous plants and animals (big cats, leeches, reptiles, insects etc.)<sup>2</sup>. People generally depend on traditional ethnomedicine for primary health care. In the present paper effort has been made to document traditional knowledge of medicinal plants of the people of Singhason hills for management of plant and animal poisons. The use of plants in traditional medicine is well known in rural areas as well as among the urban population<sup>2-3</sup>. The indigenous knowledge of medicinal plants has been well documented. Nearly 8,000 plant species were found to have ethnomedicinal importance<sup>4</sup>. Reports on the use of plant resource used as antidotes by different tribes of India have been documented by many authors<sup>5-7</sup>. Singhason hills of Karbi Anglong with its diverse topographical conditions have rich biodiversity yet, ethnobotanically least explored hence, the present study was carried out.

#### MATERIALS AND METHODS

The present ethnobotanical study of plant antidotes for plant poisons and bites were carried out during 2012-2013 amidst twelve Karbi villages of Singhason hills. Ethnobotanical data of medicinal plants were documented through questionnaires and personal observation of actual plant use by the people. Medicinal plants were collected during village and forest walks with key informants and brought to the University department. After recording the characters, plant specimens were identified with the help

of floras<sup>8,9</sup>, processed and made into voucher specimen<sup>10</sup>. Information on the plants such as local name, parts used, time of collection and methods of preparation of the plant products, dosage and mode of administration of various herbal remedies were recorded from healers.

## RESULT AND DISCUSSION

People in Singhason hills have poor access to modern health care system particularly due to lack of road connectivity with urban areas. The present study revealed the existence of the rich local knowledge of medicinal plants among the Karbis for almost all ailments including plant antidotes. The present paper provides ethnobotanical knowledge of forty two medicinal plants used by Karbis of Singhason hills as antidote for plant poisons, insect and reptile bites and food poisoning. Out of the total plants, three species are used against the irritation caused by caterpillar hairs, seventeen plants against venomous snake bites, three species are employed for the treatment of leech bites and four species are used for scorpion venoms. Herbal prescriptions are varied that includes paste, decoction, infusion, maceration; many poisons however, are managed by observing restrictions without the need for application of plant products. Ethnobotanical study is an important approach for documentation of traditional knowledge of ethnic cultures; such study provides useful leads to the discovery of active therapeutic agents.

### Plant Poisons and Local Remedies

Many wild plants are equipped with toxic chemicals, an adaptation for defence against herbivores, insects and pathogens, which are often harmful and injurious to humans. Plant poisons have been associated with many ailments in the study area though no fatal incidents have been reported. While many plants possess properties to counter both plant and animal poisons. As many as six plants are employed by local Karbis to manage poisons of mushrooms, bamboo shoots, *Oxalacuminata* Wall. ex Benth., *Datura* sp. and *Thevetia peruviana* (Pers.) K. Schum. The herbal formulas are administered in different forms like paste, powder, juice, decoction, infusion and also as crude extract. *Hibiscus sabdariffa* L. (leaves and calyx), *Citrus* sp. (fruits) and *Tamarindus indica* L. (fruits), are the most frequently used antidotes for plant and mushroom poisons. Studies on medicinal plants used to manage poisons reported the presence of phytochemicals like Tannin, Saponin, Oleanolic acid, Alkaloids, Sulphur, Terpenoides, Flavonoids, Mannitols, Glycocides, Oils, Ursolic acids, Pyrrolidine, Steroids and Formic acids<sup>7</sup> which suggest these botanicals have the potential to detoxify toxins. It is also interesting to observe that some disease conditions caused by plant poisons are managed without the actual application of medicines. For example, allergy, inflammation, bruises, rashes, and other disease conditions are caused by *Laportea crenulata* Gaudich., *Semicarpus anacardium* L. f. and *Mucuna pruriens* (L.) DC. In case of rashes caused by *Laportea crenulata* Gaudich., the affected area is initially washed with water and kept dry for many days as contact with water causes more pain. The water is poured

in a downward manner as washing the other way would result in inflicting more pain. Further, according to local belief, when a person discloses of having been rubbed against the plant is said to increase the pain. Likewise, in case of *Semicarpus anacardium* L. f., people resort to spiritual healing practiced by honouring the poisonous plant with nine bundles of wood of the same plant. Bathing is a common practice of removing plant parts which are potential sources of allergy or irritants.

### Plant Antidote for Venomous Snakes

People often fall prey to venomous snakes while venturing into the forest. The problem with Singhason hills is more acute for the fact that people venture into their local forest almost every day to the Jhum fields and for collecting minor resources. We recorded seventeen medicinal plants that formed the local ethnopharmacopoeia for snake venoms. Potential plants included *Rauvolfia serpentina* (L.) Benth. ex Kurz. (Root), *Kaempferia galanga* L. (rhizome) *Acacia pennata* Willd. (bark, stem), *Mirabilis jalapa* L. (roots) *Acorus calamus* L. (rhizome), *Pogostemon parviflorus* Benth. (root), *Dioscorea* sp. (tuber) and *Ichnocarpus frutescens* (L.) W.T. Aiton (leaves). The existence of an effective ethnomedicinal system supplements to local claims of no deaths from snake bites in tribal pockets of Singhason hills. It may be mentioned that the use of *Kaempferia galanga* L., locally known as Bithi Phaknur, is observed among Karbi ethnic group only. The paste is the predominant form of herbal preparation and applied locally; the dose however, varies as advised by the medicine expert.

### Plant used for Insect Poisons/Bites/Allergy

Insects form the most common source of poison in the study area. Ethnomedicines for insect poison are more elaborate compared to other poisons. Allergy of caterpillar's hair causes intense irritation with itches producing rashes and swellings. Such incidence is most common during late March to May when hairs from the old cocoons of the insects become a potential source of poison and whose distribution is facilitated by the windy climate during the period. Ginger (*Zingiber officinale* Rosc.) and rice grains (*Oryza sativa* L.) are handy ethnomedicines for caterpillar hairs which every adult and many children in the study area have knowledge of it. Paste of rhizomes or masticates of rice grains is applied locally on the affected area to ease irritations and burns. Rhizome of *K. galanga* L. is also used to relieve irritation caused by stinging caterpillars. Application of leaf paste of *Hibiscus sabdariffa* L. is a common analgesic for bee sting and ant bites.

### Other Poisons

Apart from the above discussed poisons, there are various other poisonous bites and stings caused by fleas, moths, worms and canines that are also a potent threat to the health of the people. Leaf paste of *Nicotiana tobaccum* L. and *N. plumbaginifolia* L. are often used to remove

leeches from the body and also applied on wounds produced due to leech bites. Saliva often proves effective for removing aquatic leeches from the body. For canine bites, *Marsdenia tinctoria* L. (leaf paste), *Datura* sp. (fruit juice), *Mimosa pudica* L. (root paste), *Piper nigrum* L. (seed), *Rauvolfia serpentina* (L.) Benth. ex Kurz. (root paste) and *Kaempferia galanga* L. (rhizome) are used. The practice involving *Datura* demands great precision on the part of the healer as a larger dose leads to adverse side effects. Paste of tuber of *Dioscorea* sp. is applied locally for three days and paste of garlic (*Allium sativum* L.) is applied as first aid for spider bites.

### The Overlapping Context of Food and Medicines

Besides their medicinal interest, many plant antidotes are also significant staple food (*Oryza sativa* L.), vegetable (*Hibiscus sabdariffa* L., *H. cannabinus* L., *P. parviflorus*) and spices and condiments (*Zingiber officinale* Rosc., *Curcuma longa* L., *Piper nigrum* L., *Ocimum kilimandscharicum* Gurke.) in local cuisine. Throughout historical periods of starvation, some wild plant species (*Dioscorea* sp.) are the most commonly used sources of energy during famine or scarcity of staple foods. Being an important source of medicine and food, some plant

antidotes like yams, rice, ginger, turmeric and *Hibiscus* sp., are cultivated in jhum fields and in home gardens. Though, the study area is abound with poisonous plants and animals, yet reports of death by such plants and animals are rare. Probable explanation is the development of resistance by the local residents through regular utilization of such wild foods over long years. Many bioactive components present in such medicinal food plants (also sometimes referred as edible medicines) have helped them gain stronger immunity. We also observed male elders in the study area preferred working bared body under the scorching sun but they hardly get inflicted with any allergic irritation caused by pollen or insect hairs. This may be attributed to the development of better immunity and resistance over various antigenic reactions or foreign body due to the utilisation of organic food components. Some of these plants are collected from the wild sources by the local poor inhabitants and selling it in the local market for money. The plant *Marsdenia tinctoria* L. is well known as the traditional source of the indigo dye, called *Sibu* among the Karbis, used for colouring garments and yarn<sup>11</sup>. Therefore, these plants have social as well as economic importance to the daily livelihood pattern of the people in the region.

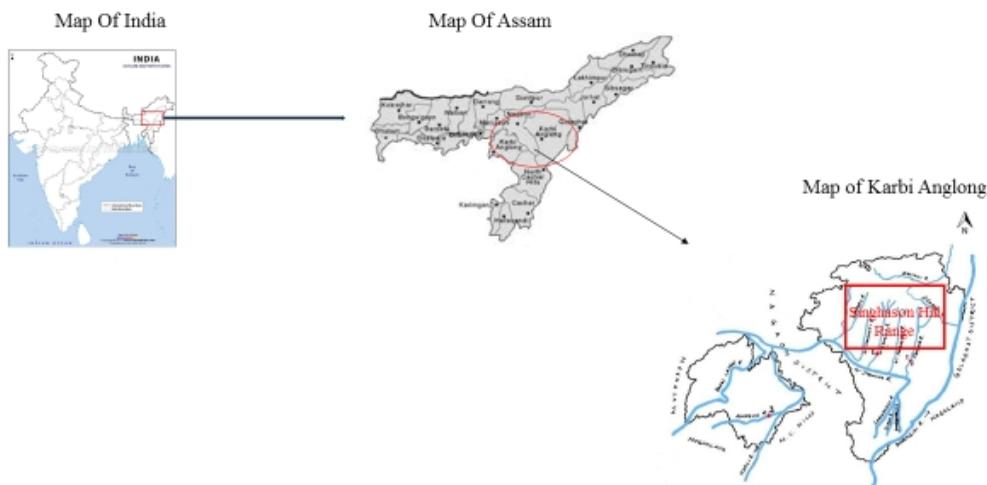


Figure 1: Map of Singhason hill range



Figure 2: A glimpse of the region having poor road connectivity.



Figure 3: Leech bite on man's ankle after the application of medicinal plant



Figure 4: *Olax acuminata* Wall. ex Benth., a plant taken as vegetable by local populace often causes dizziness and nausea



Figure 5: Bithi Phaknur (*Kaempferia galanga* L.), frequently used as a remedy for snakebites, dog-bites as well as swine-bites



Figure 6: Ginger (*Zingiber officinale* Rosc.), a spice as well as a medicine used for various ailments



Figure 7: Treatment of caterpillar's allergy with masticated rice grains



Figure 8: *Antidesma diandrum* Heyne ex. Roth., leaves are often used to cure snakebites



Figure 9: Fowl's parasite infection on a woman's neck commonly seen in the study area



Figure 10: Garlic (*Allium sativum* L.) crushed to apply on poisonous wounds



Figure 11: Lemon [*Citrus limon* (L) Burm.f.] a remedy for food poison



Figure 12: *Ichnocarpus frutescens* (L.) W.T. Aiton., leaves are applied as a remedy for snakebites

Table 1: Plants used for Bites and Poison commonly used by Karbis as Antidotes

Plants [Family]	Local Name in Karbi	Parts used	Herbal preparations as antidote
<i>Abutilon indicum</i> (L.) Sweet [Malvaceae]	Mir-at	Leaves	Crushed and applied on wound (snake bites).
<i>Acacia pennata</i> Willd. [Mimosaceae]	Khemra	Bark, leaves	Crushed and applied on the wound (snake bites).
<i>Acorus calamus</i> L. [Araceae]	Lang abap	Rhizome	Crushed and taken orally as a tonic or applied on the wound (snake bites).
<i>Allium sativum</i> L. [Liliaceae]	Harsun kelok	Bulb	Ground and applied on the affected area (Spider bites).
<i>Alocasia macrorrhiza</i> L. [Araceae]	Henchala	Leaves	Crushed and applied on the wound (Scorpion stings).
<i>Amaranthus spinosus</i> L. [Amaranthaceae]	Dido sudo	Whole plant	Crushed and applied on the wound and rubbed all over the affected part (Snake bites and scorpion stings).
<i>Antidesma diandrum</i> Heyne ex. Roth. [Euphorbiaceae]	Insum	Leaves	Crushed and applied on the wound (Snake bites).
<i>Aristolochia saccata</i> Wall. [Aristolochiaceae]	Re-etso	Leaves, roots	Crushed and taken as a tonic (Food poison).
<i>Baccaurea ramiflora</i> Lour. [Euphorbiaceae]	Dampjuk	Fruits	Masticated with saliva and taken orally (Snake venom).
<i>Baliospermum montanum</i> Willd. [Euphorbiaceae]	Parok Hanthu	Roots	Ground and applied over the affected area (Snake bite).
<i>Citrus limon</i> (L) Burm.f. [Rutaceae]	tumeng	Fruit	Juice is taken as a tonic (Poison).
<i>Costus speciosus</i> (J. Koenig. ex Retz.) Smith. [Costaceae]	Ai-upo	Rhizomes	Ground and applied on the wound (Snake bites).
<i>Curcuma longa</i> L. [Zingiberaceae]	Tharmit	Rhizomes	Crushed and applied on the affected area (Leech bites).
<i>Datura fastuosa</i> L. [Solanaceae]	Hepi chumprak	Roots	Ground and applied on the wound (Dog bites).
<i>Dioscorea</i> Sp. [Dioscoreaceae]	Phurui	Tuber	Taken orally (Spider bites)
<i>Etilingera elatior</i> (Jack.) R.M. Sm. [Zingiberaceae]	Pindong	Rhizomes	Masticated and taken orally (Food poisoning).
<i>Gloriosa superba</i> L. [Liliaceae]	Mir jangkek	Rhizomes	Crushed and taken orally as tonic (Snake bites and scorpion stings).
<i>Helminthostachys zeylanica</i> (L.) Hook. [Ophioglossaceae]	Ruitiki amir	Roots	Pounded and applied on the wound (Centipede/millipede bites)
<i>Heteropanax fragrans</i> Seem. [Araliaceae]	Kin-chor	Leaves	Crushed and taken orally (Snake bites).
<i>Heterophragma adenophyllum</i> Seem. [Bignoniaceae]	Lotum poh	leaves	Crushed and applied on the wound (Snake bites).
<i>Hibiscus cannabinus</i> L. [Malvaceae]	Hanserong	Leaves	Crushed and rubbed on the affected area (Bee sting).
<i>Hibiscus sabdariffa</i> L. [Malvaceae]	Hanserong ke-er	Leaves	Crushed and rubbed on the affected area (Ant bites).
<i>Ichnocarpus frutescens</i> (L.) W.T. Aiton [Apocynaceae]	Parok hanthor	Leaves	Crushed and applied on the wound (Snake bites).
<i>Jatropha gossypifolia</i> L. [Euphorbiaceae]	Longle pharche	Roots	Crushed and applied on the wound (Snake bites).
<i>Kaempferia galanga</i> L. [Zingiberaceae]	Bithi phaknur	Rhizomes	Crushed and applied on wound and over the affected area in case of caterpillar hair stings (Snake bites, dog bites, swine bites and caterpillar allergy).
<i>Kalanchoe heterophylla</i> Prain. [Crassulaceae]	Meh abap	Leaves	Crushed and applied on the affected part (Insect bites).
<i>Laportea crenulata</i> Gaudich. [Urticaceae]	Bap kangsam	Fruits	Masticated and applied on the affected area (Scorpion stings).
<i>Marsdimia tinctoria</i> L. [Asclepiadaceae]	Sibu	Leaves	Crushed and applied on the wound (Cat bites).
<i>Mimosa pudica</i> L. [Mimosaceae]	Bap therak	Roots	Ground and juice is taken orally (Rabies).
<i>Mirabilis jalapa</i> L. [Nyctaginaceae]	Hunmili-amir	Roots	Ground and applied on the wound (Snake bites).
<i>Nicotiana plumbaginifolia</i> L. [Solanaceae]	Duma	Leaves	Crushed and applied on the wound (Leech bites).
<i>Nicotiana tobaccum</i> L. [Solanaceae]	Duma	Leaves	Crushed and applied on the affected area (Leech bites).
<i>Ocimum killimandscharicum</i> Gurke. [Lamiaceae]	Lopong	Leaves	Crushed and applied on the wound (Fowl's parasite).
<i>Oryza sativa</i> L. [Poaceae]	Sok	Seed	Masticated with saliva and rubbed all over the affected area (Caterpillar's allergy).
<i>Piper nigrum</i> L. [Piperaceae]	Jaluk	Fruits	Ground and applied on the affected area (Dog bites).
<i>Pogostemon parviflorus</i> Benth. [Lamiaceae]	Hanbipo	Roots	Ground and applied on the wound (Snake bites).
<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz [Apocynaceae]	Methan krokdh	Roots	Grounded and applied on the wound (Snake bites).
<i>Scoparia dulcis</i> L. [Scophulariaceae]	Hemepi arphek	Leaves	Crushed and taken orally (Poison).
<i>Sida rhombifolia</i> L. [Malvaceae]	Bijangnai	Whole plant	Crushed and applied on the affected part (Insect bites).
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight and Arnott. [Combretaceae]	Arjun	Bark	Soaked in water overnight and the liquid is taken as a tonic (Food poisoning).
<i>Tamarindus indica</i> L. [Caesalpinaceae]	Tanteli	Fruits	Masticated and taken orally (Food poisoning).
<i>Zingiber officinale</i> Rosc. [Zingiberaceae]	Hanso	Rhizome	Crushed and applied on the wound (Snake bites).

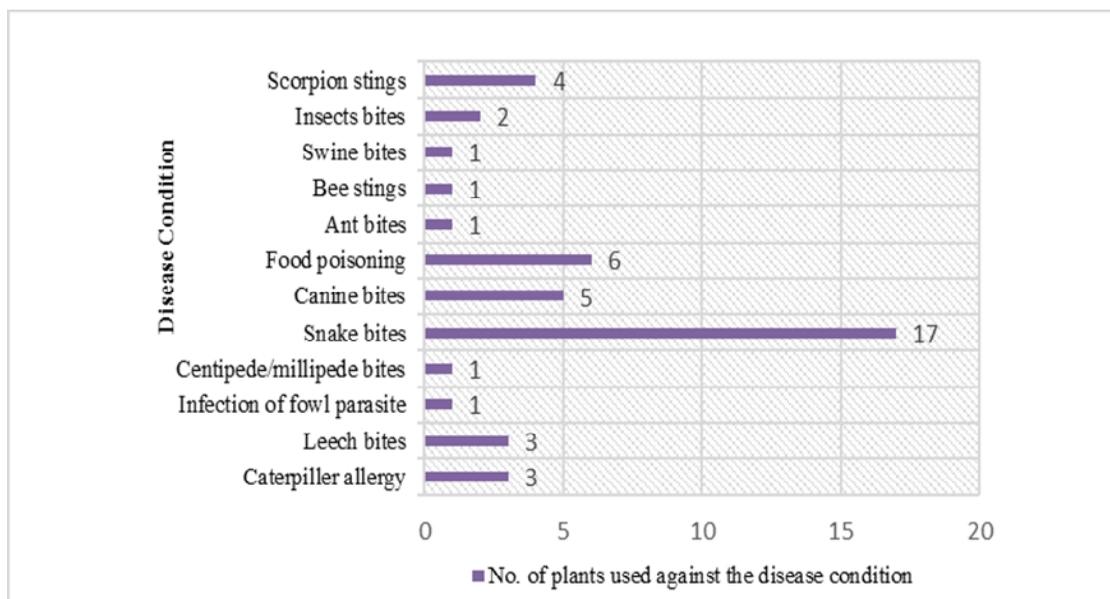


Figure 13: A graphical presentation of plant medicines for various poisons showing maximum number of plants used as antidotes for snake bites while minimum use of plants for bites of swines, bees, ants and parasites

Table 2: Statistical Analysis of the Different Plant Parts used as Antidotes

Plant parts	Nos. of Species	Nos. of Family
Leaves	16	13
Rhizomes	7	4
Bulbs	1	1
Roots	8	8
Fruits	5	5
Seed	1	1
Barks	2	2
Tubers	1	1
Whole Plant	2	2

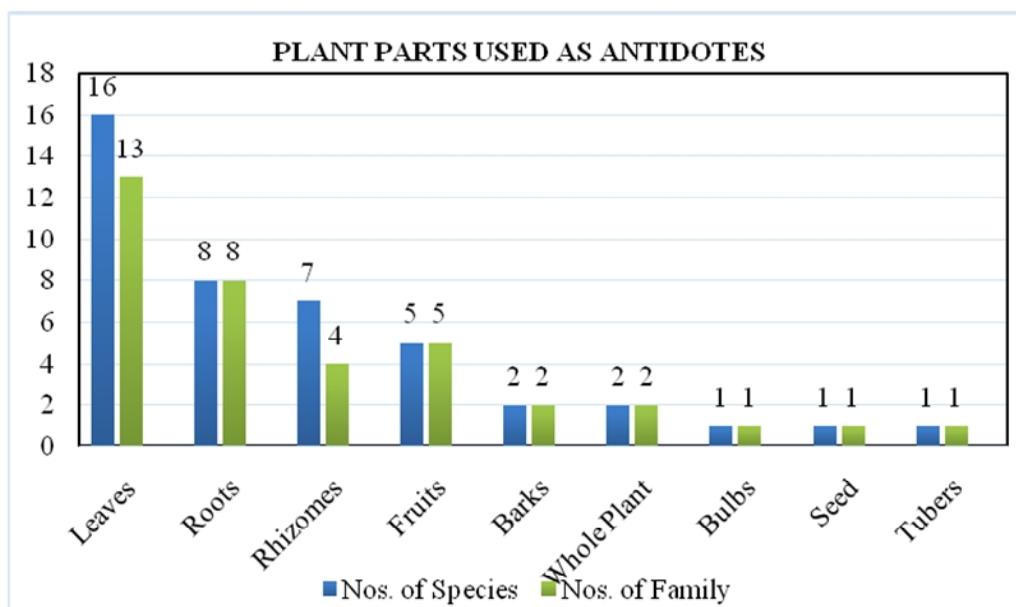


Figure 14: A graphical presentation on the different plant parts used as Antidotes. The graph shows maximum usage of leaves of 16 species that belongs to 13 different plant families while minimum use of bulbs, seeds and tubers of one species each of different plant families

## CONCLUSION

Traditional medicine remains an integral part of the health care practice of the ethnic tribe in Singhason hills. The present ethnobotanical study of poisons and antidotes is a contribution to reveals the pattern of people-plant interaction in the region. Plant medicines play important role in health care practice and survival of forest dwellers around the world. Traditional knowledge of medicinal plants is acquired through long years of interactions with the local environment and trial and error. Traditional medicinal practice may not satisfy the scrutiny of modern science but cannot be discarded as well. It is a challenge to ethnobotanists and other people related with the subject to validate traditional medicine by using modern biological principles and tools. Traditional practice need not necessarily be replaced by modern ones but the existing practices (if found safe) can be encouraged for the benefit of rural folk through value addition. Pharmacological study of traditional medicines presents a viable option for determining the active principle and mode of action. Ethnobotanical study can contribute towards documentation of traditional knowledge and also provide potential leads for discovering active therapeutic agents.

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