

Folklore claims of some medicinal plants as antidote against poisons among the Karbis of Assam, India

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Abstract

Plant medicines used by the Karbis for treatment and management of poisons, including food poisoning, is presented here. Method included rapid ethnobotanical appraisal, questionnaire-based interview, group discussions with focus groups and personal observations. Both spiritual healing (rituals) and plant medicines are practiced to detoxify and manage poisons of plant and animal origin. Folk use of 54 medicinal plants belonging to 45 genera and 34 botanical families have been studied and documented. Selection of some plant antidotes have semblance with the popular concept of 'Doctrine of Signatures'. Folk medicines must be documented, validated and their practice be encouraged for the benefit of rural mass. Food-medicines overlap exhibited in many cultures can be an interesting area of investigation.

Key words: Karbi ethnic group, poisons, antidotes, food-medicine overlap.

INTRODUCTION

The Karbi Anglong district in Assam is lies between 25° 30'–26° 36' N and 92° 00'–93° 54' E, covering a geographical area of 10,434 sq km. Karbis represents one of the major tribes in the district along with Dimasa, Tiwa, Panar, Garo, Kuki, Rengma Naga and Man Tai tribes (Phangcho 2001). Eethnically Karbis are Mongoloid and linguistically belong to Tibeto-Burman and more particularly the Kuki-Chin sub-group of languages. They are believed to have migrated from the Kuki-Chin area in and around the Chindwin river valley in Western Myanmar (Phangcho 2001). Karbis are mainly agriculturists and practice *jhum* (shifting cultivation) in the hills; in the plains and valleys they practice settled agriculture. Hunting and fishing are their secondary occupations. Poisons of plant and animal origin are common cause of health problems particularly in the hill region. The daily life of the people demands frequent visits to forest to collect their daily requirements and so, there remains high probability of encountering with poisonous plants and animals (big cats, leeches, reptiles, insects etc). Folk medicines or traditional medicine forms the main source of primary healthcare in the district. Folks consider local medicines are safe, cheap and easily accessible. Karbis possess local unwritten pharmacopoeia to manage plant and animal poisons and the study and

documentation of their ethnomedicinal knowledge in this respect is the aim of the present investigation.

The use of plants in traditional medicine is well known in rural areas as well as among urban population (WHO 2008). Nearly 8,000 plant species were found as of ethnomedicinal importance (Anonymous 1994). Reports on the use of plant resource for antidotes by different tribes of India have been reported in many publications (Chopra *et al* 1956; Kumar *et al* 1998; Sikdar & Dutta 2008; Hynniewta & Kumar 2008; Meenatchisundaram & Michael 2009; Gomes *et al* 2010; Singha *et al* 2012; Khaleel Basha & Sudarsanam 2012; Dey & De 2012; Lokho 2012). These reports, however, are silent about folk medicinal knowledge of antidotes among the Karbis of Karbi Anglong district, Assam. Effort is made in the present paper to highlight folklore claims of plants antidotes used by the Karbi ethnic group to cure and manage poisonous bites, stings and poisonous plants.

MATERIALS AND METHODS

The present ethnopharmacological study of plant antidotes for plant and animal poisons was undertaken during 2009–2012 among the Karbi ethnic group living in Karbi Anglong district of Assam. Consent of informants was obtained before initiating the research. First of all checklist of medicinal plants used against poison of any source was prepared through rapid ethnobotanical appraisal (Martin 1995); this method included unstructured interviews of elders and group discussions. Second, questionnaire-based interviews of eight elders each from 25 randomly selected villages. This data was compared with the checklist and substantiated by personal observations of actual plant use to the possible extent. With the help of traditional healers and local guides we collected medicinal plants from natural habitats and identified with the help of floras (Hooker 1875-1897; Kanjilal & Bor 1934-1940; Prain 1903). Online data bases like *The International Plant Names Index* (www.ipni.org) and *The Plant List* (www.theplantlist.org) was referred for correct nomenclature and author citations; the plants were processed into voucher specimen following standard methods of Jain & Rao (1977) and the specimens are preserved in the Herbarium of the Department of Life Science & Bioinformatics, Assam University- Diphu Campus, Diphu.

RESULT AND DISCUSSION

The present paper provides information of 54 medicinal plants belonging to 45 genera under 34 families used by the Karbis as antidote for plant and animal poisons and food poisoning (Table 1). Some of the potential antidotes are presented in Plate I. The family Zingiberaceae has highest representation with five species followed by Solanaceae and Aristolochiaceae with four and three species respectively. Both, spiritual healing (rituals) and plant medicines are practiced to detoxify and manage poisons of plant and animal origin. Selection of some plant antidotes have semblance with the popular concept of *Doctrine of Signatures*. Folk medicines must be documented and validated with modern biological principles and tools. Folk medicines need not necessarily be replaced by modern one but the existing practice (if found safe) can be encouraged for the benefit of rural folk. Food-medicines overlap exhibited in many food cultures can be an interesting area of investigation.

Folklore of poisons and antidotes

According to Karbi traditional folklore, present day plants and animals are incarnation of deities and toxic principles in some plants is inherited from their ancestors (i.e., deities). The general view is like that poisonous plants and animals were evil in their previous life but antidotes for their poisons are believed to be distributed among other plants. Potential plant

Table 1. Inventory of medicinal plants used against poison by the Karbis of Assam

Plants [Family]; Voucher No.	Karbi Name	Mode of use	Parts used
<i>Abrus precatorius</i> Linnaeus [Fabaceae]; <i>Teron 974</i> , dated 10.05.2013	<i>Chuselok</i>	Power of seeds along with other plants given two times daily as antidote for <i>bab</i>	Seed
<i>Acorus calamus</i> Linnaeus [Araceae]; <i>Teron 975</i> , dated 13.08.2011	<i>Lang abab</i>	Power of rhizome along with other plants given two times daily as antidote for <i>bab</i>	Rhizome
<i>Allium sativum</i> Linnaeus [Liliaceae]; <i>Teron 1016</i> , dated 03.01.2012	<i>Harsun kelok</i>	Paste of leaves applied twice daily as first aid for snake bite	Leaf
<i>Alocasia fornicata</i> (Roxburgh) Schott [Araceae]; <i>Teron 945</i> , dated 04.08.2011	<i>Mainipat</i>	Paste of corm applied locally twice daily in subterranean insect <i>ingkimarlang</i>	Corm
<i>Alpinia nigra</i> (Gaertn.) Burt [Zingiberaceae]; <i>Teron 239</i> , dated 14.06.2003	<i>Inglona tara</i>	Power of root along with other plants given two times daily as antidote for <i>bab</i>	Root
<i>Aristolochia platanifolia</i> (Klotzsch) Duchartre [Aristolochiaceae]; <i>Teron 1018</i> , dated 09.10.2012	<i>Desirkep</i>	Powder of root alone or with other plants take twice daily for three days as antidote for <i>bab</i>	Root
<i>Aristolochia indica</i> Wallich [Aristolochiaceae]; <i>Teron 743</i> , dated 02.06.2005	<i>Ri-etsa</i>	Powder of root alone or with other plants take twice daily for three days as antidote for <i>bab</i>	Root
<i>Aristolochia saccata</i> Wallich [Aristolochiaceae]; <i>Teron 757</i> , dated 05.06.2005	<i>Rikang batelong</i>	Powder of root alone or with other plants take twice daily for three days as antidote for <i>bab</i>	Root
<i>Averrhoa carambola</i> Linnaeus [Oxalidaceae]; <i>Teron 1050</i> , dated 23.10.2012	<i>Torte</i>	Fruits are given in <i>Datura</i> poisoning.	Fruit
<i>Begonia roxburghii</i> (Miquel) DC. [Begoniaceae]; <i>Teron 734</i> , dated 02.06.2005	<i>Suvat</i>	Paste or juice of whole plant given twice daily in insecticide poisoning.	Whole plant
<i>Boesenbergia rotunda</i> (Linnaeus) Mansfeld [Zingiberaceae]; <i>Teron 292</i> , dated 11.07.2004	<i>Tehaso</i>	Paste of rhizome applied in catfish sting.	tuber
<i>Capsicum frutescens</i> Linnaeus [Solanaceae]; <i>Teron 976</i> , dated 13.08.2011	<i>Birikman</i>	Paste of leaves applied locally in bee sting.	Leaf

Plants [Family]; Voucher No.	Karbi Name	Mode of use	Parts used
<i>Cayratia pedata</i> (Lamarck) Gagnepien [Vitaceae]; Teron 874, dated 07.09.2009	<i>Nimsorepak</i>	Decoction of leaves given in food poisoning till recovery	Leaf
<i>Citrus limon</i> (Linnaeus) Burman f. [Rutaceae]; Teron 802, dated 12.06.2006	<i>Thesotumeng</i> (wild lemon)	Powder of stem bark or rind with water give in snake bite and <i>bab</i> .	Stem, Fruit
<i>Crassocephalum crepidioides</i> (Bentham) Moore [Asteraceae]; Teron 715, dated 28.05.2005	<i>Bab cherdik</i>	Paste of leaves rubbed on the body in caterpillar allergy	Leaf
<i>Cucurbita pepo</i> Linnaeus [Cucurbitaceae]	<i>Bonghom chingkep</i>	Stalk or fruit used in herbal formula for <i>bab</i> .	Fruit
<i>Curculigo orchoides</i> Gaertner [Hypoxidaceae]; Teron 977, dated 04.08.2011	<i>Bab telongpi</i>	Root used in herbal formula for <i>bab</i> .	Root
<i>Curcuma longa</i> Linnaeus [Zingiberaceae]; Teron 810, dated 29.08.2012	<i>Tharmit</i>	Paste of rhizome applied in leech bites to heal the wound	Rhizome
<i>Datura metel</i> Linnaeus [Solanaceae]; Teron 745, dated 28.04.2008	<i>Thesumphrak</i>	Calculated dose of fruit juice is given once daily to patient for dog bite	Fruit
<i>Dioscorea alata</i> Linnaeus [Dioscoreaceae]; Teron 1026, dated 09.09.2011	<i>Ruidoksudo</i>	Paste of whole plant is applied twice daily till recovery in snake bite.	Whole plant
<i>Dioscorea bulbifera</i> Linnaeus [Dioscoreaceae]; Teron 1030, dated 09.06.2013	<i>Habit sok kedak</i>	Bulbil made into paste and applied locally or take orally in dog bite	Bulbil
<i>Garcinia pedunculata</i> Roxburgh ex Buchanan-Hamilton [Clusiaceae]; Teron 892, dated 09.12.2012	<i>Pranpree</i>	Paste of rind for snake and spider bites; applied locally once daily for 3 days.	Fruit
<i>Helminthostachys zeylanica</i> (Linnaeus) Hook. [Ophioglossaceae]; Teron 853, dated 25.09.2009	<i>Han votar</i>	Extract of roots given thrice daily for 3 days.	Root
<i>Hibiscus sabdariffa</i> Linnaeus [Malvaceae]; Teron 958, dated 02.11.2011	<i>Hanserong</i>	Leaves and calyxes are general antidote for food and chemical poisonings.	Leaf; Calyx
<i>Justicia gendarussa</i> Burman f. [Acanthaceae]; Teron 825, dated 09.11.2005	<i>Chektere</i>	Root is a component of herbal formulation for <i>bab</i> .	Root
<i>Kaempferia galanga</i> Linnaeus [Zingiberaceae]; Teron 781, dated 15.06.2005	<i>Bithiphaknur</i>	Paste of whole plant applied 20r 3 times in dog and pig bite.	Whole plant
<i>Lagenaria siceraria</i> (Molina) Standley [Cucurbitaceae]; Teron 978, dated 14.06.2006	<i>Bong</i>	Paste of leaves applied locally as analgesic in bee sting.	Leaf



Plate I: Some medicinal plants used as antidotes by the Karbis of Assam. Fig. 1 *Helminthostachys zeylanica* (Linnaeus) Hooker; **Fig. 2.** *Aristolochia platanifolia* (Klotzsch) Duchartre; **Fig. 3.** *Hibiscus sabdariffa* Linnaeus; **Fig. 4.** *Averrhoa carambola* Linnaeus; **Fig. 5.** *Rauvolfia serpentina* (Linnaeus) Bentham ex Kurz; **Fig. 6.** *Nicotiana plumbaginifolia* Viviani; **Fig. 7.** *Boesenbergia rotunda* (Linnaeus) Mansfeld; **Fig. 8.** *Begonia roxburghii* (Miquel) DC.; **Fig. 9.** *Zingiber officinale* Roscoe; **Fig. 10.** Fruits of *Sapindus mukorossi* Gaertner; **Fig. 11.** *Kaempferia galanga* Linnaeus; **Fig. 12.** *Marsdenia tinctoria* R. Brown

Plants [Family]; Voucher No.	Karbi Name	Mode of use	Parts used
<i>Marsdenia tinctoria</i> R. Brown [Asclepiadaceae]; <i>Teron 271</i> , dated 01.11.2004	<i>Bujir</i>	Paste of leaves applied twice daily for 3 days on wounds in dog bites.	Leaf
<i>Melastoma malabathricum</i> Linnaeus [Melastomataceae]; <i>Teron 1012</i> , dated 03.05.2012	<i>Longle bik bik</i>	Whole used in herbal formulation for <i>bab</i> .	Whole plant
<i>Mirabilis jalapa</i> Linnaeus [Nyctaginaceae]; <i>Teron 17</i> , dated 04.10.2001	<i>Hunmili amir</i>	Extract of roots take twice daily for 3 days in snake bites	Root
<i>Narenga</i> sp. [Poaceae]; <i>Teron 840</i> , dated 24.12.2010	<i>Phelangpi</i>	Powder of roots used in herbal formulation for <i>bab</i> .	Root
<i>Nicotiana plumbaginifolia</i> Viviani [Solanaceae]; <i>Teron 840</i> , dated 29.09.2009	<i>Duma vouching</i>	Crushed leaves for removing leeches	Leaf
<i>Nicotiana tabacum</i> Linnaeus [Solanaceae]; <i>Teron 863</i> , dated 29.09.2009	<i>Duma keme</i>	Crushed leaves for removing leeches	leaf
<i>Ocimum canum</i> Sims [Lamiaceae]; <i>Teron 297</i> , dated 29.11.2004	<i>Lopong</i>	Leaf paste applied locally twice daily for 3 days in snake and frog bites	Leaf
<i>Oryza sativa</i> Linnaeus [Poaceae]; <i>Teron</i> <i>886</i> , dated 09.10.2012	<i>Sang</i>	Paste of grains rubbed on the body in caterpillar allergy	Grain
<i>Phrynium pubenerve</i> Blume [Marantaceae]; <i>Teron 849</i> , dated 21.06.2008	<i>Loru phanche</i>	Extract of roots given orally snake bite, thrice daily for 3 days	Root
<i>Piper nigrum</i> Linnaeus [Piperaceae]; <i>Teron 885</i> , dated 25.10.2012	<i>Ahom birik</i>	Paste of fruits applied on wounds in dog bite as first aid.	Fruit
<i>Pogostemon purviflorus</i> Bentham [Lamiaceae]; <i>Teron 733</i> , dated 23.10.2011	<i>Hanbipo</i>	Paste or decoction of roots given three times daily for 3 days in snake bites	Leaf
<i>Polygonum affine</i> D. Don [Polygonaceae]; <i>Teron 779</i> , dated 13.06.2005	<i>Hanjareng</i>	Tender shoots or its juice give in pesticide poisoning till recovery	Leaf
<i>Polygonum microcephalum</i> D. Don [Polygonaceae]; <i>Teron 784</i> , dated 15.06.2005	<i>Delap</i>	Tender shoots or its juice give in pesticide poisoning till recovery	Leaf
<i>Premna pinguis</i> C.B. Clarke [Lamiaceae]; <i>Teron 880</i> , dated 17.06.2012	<i>Phanglongle</i>	Tubers used in herbal formulation for <i>bab</i>	Tuber
<i>Psilanthus bengalensis</i> (Roxburgh <i>ex</i> Schultes) J.F. Leroy [Rubiaceae]; <i>Teron</i> <i>251</i> , dated 15.06.2003	<i>Mirherai</i>	Root along with other plants made into paste and applied in dog bite.	Root

Plants [Family]; Voucher No.	Karbi Name	Mode of use	Parts used
<i>Pterocarpus santalinus</i> Linnaeus f. [Fabaceae]; <i>Teron</i> 817, dated 02.03.2012	<i>Chopak</i>	Seeds used in herbal formulation for <i>bab</i>	Seed
<i>Rauvolfia serpentina</i> (Linnaeus) Bentham ex Kurz [Apocynaceae]; <i>Teron</i> 766, dated 05.06.2005	<i>Methan krokdi</i>	Root form one of the important ingredients of herbal formulation for <i>bab</i>	Root
<i>Rhus javanica</i> Linnaeus [Anacardiaceae]; <i>Teron</i> 774, dated 14.06.2005	<i>Thesebo</i>	Fruits as antidote for mushroom poisoning till recovery	Fruit
<i>Rhus</i> sp. [Anacardiaceae]; <i>Teron</i> 880, dated 17.06.2012	<i>Chenho</i>	Bark is a component of herbal formulation for <i>bab</i>	Stem bark
<i>Saccharum bengalense</i> Retzius [Poaceae]; <i>Teron</i> 869, dated 07.06.2012	<i>Tibong</i>	Paste of root taken orally or applied locally thrice daily till recovery in snake bite.	Root
<i>Sapindus mukorossi</i> Gaertner [Sapindaceae]; <i>Teron</i> 887, dated 17.11.2009	<i>Kangburu</i>	Fruit in a component of herbal formulation for <i>bab</i>	Fruit
<i>Terminalia chebula</i> Retzius [Combretaceae]; <i>Teron</i> 258, 22.06.2003	<i>Siluka</i>	Fruit used in herbal formulation for <i>bab</i>	Fruit
<i>Xanthium strumarium</i> Linnaeus [Asteraceae]; <i>Teron</i> 75, dated 17.10.2001	<i>Parok hanthor</i>	Leaf juice given in food poisoning till recovery	Leaf
<i>Xylosma longifolia</i> Clos [Flacourtiaceae]; <i>Teron</i> 1030, dated 14.04.2013	<i>Thengpi kani</i>	Stem bark is important ingredient of herbal formulation for <i>bab</i>	Stem bark
<i>Zingiber officinale</i> Roscoe [Zingiberaceae]; <i>Teron</i> 892, dated 27.11.2009	<i>Hanso</i>	Rhizome forms important ingredient of herbal formulation for <i>bab</i>	Rhizome

antidotes are said to carry some signatures for human to identify, a concept that finds some parallelism with the popular *like cures like* concept of the *Doctrine of Signature*. For example, *han votar* (*Helminthostachys zeylanica*) is used for millipede venom because the root system of the plant resembles the legs of millipede. Another popular practice is resorting to spiritual healing. It is believed that every organism (plant or animal) have legend of their origin and that if the legend is invoked in case of poisoning the deity get appeased and withdraw the poison from the victim. Most animal poisons (snakes, spiders, scorpions, ants, bees, dogs, cats, etc) and some plant poisons are treated by invoking legends of the organism. This practice is more prevalent in rural areas as the people have less access to modern medicines and proper healthcare facilities due to poverty and lack of access to modern medicines. In summary, the religious beliefs of the Karbis suggest presence of antidote for all poisons. So, now, the identification of such potential plants and discovery of the bioactive molecules from those is a challenge before us.

Bab – a mysterious witchcraft of poison

In the past witchcraft was said to be common in Karbi society. Some families resort to such evil practice by poisoning the food of unsuspecting guests visiting the house. The poison, the

origin of which is obscure, is referred to as *bab*. *Bab* is believed to be an evil deity and who is patronised by any one member of the family. The deity is believed to bring wealth and fortune to the family and in return the keeper has to sacrifice human being to appease the deity. Generally, symptoms appear after a few hours of poisoning; the victim suddenly falls ill and starts vomiting. In severe cases blood come out of the mouth; it is said to be fatal if proper medication is not provided in time. Local medicine men have potent antidotes for *bab*; the prescription though not completely disclosed to the present authors, is presumed to be plant-based.

Plant poisons and remedies

While many plants are indispensable for human sustenance some species accumulate toxic chemicals (a trait developed for self defence against herbivores, insects and pathogens) which are harmful and often fatal to human. Plant poisons including food poisoning are common causes of health problems among the Karbis, attributed mainly due to frequent venture into forests and sometimes due to wrong selection of food plants. Mushrooms, bamboo shoots, *Oxalac acuminata* Wall. ex Benth., *Datura* spp., *Thevetia peruviana* (Persoon) K. Schuman, *Rhus* spp., *Laportea crenulata* Gaudichaud, *Semicarpus anacardium* Linnaeus f. and *Mucuna pruriens* (Linnaeus) DC. are common sources of poisons and ailments. Among these, mushroom poisoning is said to be most severe though no fatal incidents have been reported despite the lack of modern medical facilities. This suggests the effectiveness of local pharmacopeia for the treatment and management of poisons or people have sound knowledge of selection between edible and poisonous mushrooms. The common herbal formulae for poisons include paste, powder, juice, decoction, infusion and also crude extract. *Hibiscus sabdariffa* Linnaeus (leaves and calyx), *Citrus* sp. (fruits) and *Tamarindus indica* Linnaeus (tender shoots, fruits) are the most frequently used antidotes for food poisoning. For *Hibiscus sabdariffa* and *Tamarindus indica* the plant parts are either eaten raw or boiled and the juice is taken orally. Citrus fruits are directly eaten or the juice is given in case of food poisoning.

It is also observed that allergy, inflammation, bruises, rashes, and other symptoms caused by *Laportea crenulata* Gaudich., *Rhus*, *Semicarpus anacardium* Linnaeus f. and *Mucuna pruriens* (Linnaeus) DC. are being managed and cured by observing restrictions without actual applications of plant products. For example, in case of rashes caused by *Laportea crenulata* Gaudich., the affected part is initially washed with water and left dry for many days; contact with water causes more pain, even during initial washing the water should drain downward and washing otherwise may results in inflicting more pain. Further, according to local belief, if a person discloses having inflicted by the plant it is said to exaggerate the pain. Likewise, bruise and rashes caused by the acrid latex of *Rhus* spp. and *Semicarpus anacardium* Linnaeus f. (*Barla*) are managed by observing certain spiritual practice. Nine bundles of wood of the same plant are offered under the tree and the victim make sacred incantations '*chelem nangne, pini penke itum kachekaklo, jirpo-jirpi chekak nangpo*' (let us not play, from today we part our ways, from today we are no more friends). Such practice is based on local belief that in the good old days human can freely communicate with plants and were good friends. In the present time when a person comes in contact with the plant the latter intends to befriend human through its poison. When such a victim requests not to make friend, the plant is said to take back its poison from the victim. Bathing is a common practice of removing irritating hairs of *Mucuna pruriens* and other potential irritants.

Plants used for animal poisons

Poisonous animals are more common than plant poisons and food poisoning. The problem is more acute among the hill Karbis who often fall prey to venomous snakes, spiders, insects, scorpions, annelids, etc. as they had to frequently venture into forest for one or the other

reason. Insects form the most common source of poison among animal groups and as obvious ethnomedicines for insect poisons are more elaborate as compared to other poisons. Allergy of caterpillar hairs cause intense irritation with itches producing rashes and swellings. Ginger (*Zingiber officinale* Roscoe), and rice grains (*Oryza sativa* Linnaeus) are handy ethnomedicines for this problem which every adults and many children have knowledge of its application. Paste of rhizomes or masticates of rice grains are applied locally on the affected area to ease irritations and burning sensation. Rhizome of *Kaempferia galanga* Linnaeus is also used to relieve irritation caused by stinging caterpillars. Leaf paste of *Hibiscus sabdariffa* Linnaeus or *Lagenaria siceraria* (Molina) Standley is commonly applied to relieve pain due to bee sting and ant bites. Another practice, though sounds unusual, is the application of sputum in ant bites which is said to be analgesic. In case of sting by catfish, paste of rhizome of *Boesenbergia rotunda* (Linnaeus) Mansfeld is applied to relieve pain and prevent inflammation.

Snake venom is treated and managed through spiritual healing as well as by medicines. Local ethnopharmacopoeia for snake venoms included *Rauwolfia serpentina* (Linnaeus) Bentham ex Kurz (roots), *Kaempferia galanga* Linnaeus (rhizome), *Mirabilis jalapa* Linnaeus (roots) *Acorus calamus* Linnaeus (rhizome), *Pogostemon parviflorus* Bentham (roots), *Dioscorea* sp. (tubers) and *Xanthium strumarium* Linnaeus (leaves). Existence of effective ethnomedicinal system supplements folk claims of no deaths from snake bites. It may be mentioned that use of *Kaempferia galanga* Linnaeus, locally known as *Bithi Phaknur*, is observed among the Karbis only. Paste is the predominant form of herbal preparation and applied locally or taken orally; the dose, however varies as per the advice of the local medicine men.

Leaf paste of *Nicotiana tobaccum* Linnaeus and *N. plumbaginifolia* Linnaeus are often used to remove leeches from body and also applied on wounds caused by the annelids. Paste of rhizome of *Curcuma longa* Linnaeus is also applied to cure the wounds. Saliva often proves effective for removing leeches from body. For canine bites, leaf paste of *Marsdenia tinctoria* Linnaeus, *Datura* spp. (fruit juice), *Rauwolfia serpentina* (Linnaeus) Bentham ex Kurz (root paste) and *Kaempferia galanga* Linnaeus (rhizome) are sources of ethnomedicines. The practise involving *Datura* demands great precision on the part of the healer as larger dose leads to adverse side effects. Paste of tuber of *Dioscorea* spp. and bulb of garlic (*Allium sativum* Linnaeus) is applied locally for three days in spider bites.

Medicines as food- an ethnopharmacological perspective

Several species of potential antidotes are consumed in day to day life by the Karbis (Table 1). Among the common use categories are staple food (*Oryza sativa* Linnaeus), vegetable (*Hibiscus sabdariffa* Linnaeus, *Pogostemon parviflorus* Bentham, *Lagenaria siceraria* (Molina) Standley, *Crassocephalum crepedioides* (Bentham) Moore, etc) and spices and condiments (*Zingiber officinale* Roscoe, *Curcuma longa* Linnaeus and *Ocimum canum* Sims). Both wild and cultivated species of *Dioscorea* spp. are eaten as food and snacks. These plants provide ample energy and other useful ingredients to the users (i.e., Karbis). This means their body is regularly charged with bioactive compounds present in these edible medicinal plants. Regular use of these plant foods over long years have contributed to the development of strong immunity to many potential toxins. In this regard *H. sabdariffa* and *Polygonum microcephalum* D. Don are particularly important. The Karbis usually cook small fishes with these plants. This is said to remove the unpalatable odour of small fishes on one hand and the fish in turn reduce sourness of the plant on the other hand. Further, partially putrefied fish or meat is specifically cooked with any of these plants to detoxify toxic compounds present in the putrefied food. One popular view is often referred among the

Karbis “*any plant that taste sour can negate toxic effects*”. Studies on medicinal plants used to manage poisons reported the presence of phytochemicals like Tannin, Saponin, Oleonic acid, Alkaloids, Sulphur, Turpenoides, Flavinoïdes, Mannitols, Glycocides, Oils, Urosolic acids, Pryrrolidin, Steroids and Formic acids (Singha *et.al* 2012) which suggest these botanicals have the potential to detoxify toxins.

Another observation in this regard is that many elder male-folks prefer to work with bare body under the scorching sun and dust but they hardly get inflicted with any allergic irritation caused by plants, pollens or insects. One can presume that unintentional consumption of medicinal plants as food have attributed to development of better immunity and resistance against varied antigenic reactions or foreign body. Further, poor families sell potential medicinal plants as food in the local markets (Kar & Borthakur 2007) for cash income. *Marsdenia tinctoria* R. Brown is traditional source of the indigo dye (Teron & Borthakur 2012); use of garments dyed with *Marsdenia tinctoria* can also contribute to the health of the users as the skin comes in contact for long period with the organically-dyed garment. Thus, besides medicines, plant antidotes used by the Karbis have social as well as economic importance.

CONCLUSION

Plant-based folk antidotes are still vibrant among the Karbis; selection of medicinal plants is partly guided by their world views and the Doctrine of Signature. Folk medicines or traditional medicine practice may not satisfy scrutiny of modern science but cannot be discarded as well. Folk medicines need urgent documentation before it is too late and such practices may be validated through modern biological principles and tools. Pharmacological study of traditional medicines presents viable option for determining the active principle and mode of action. Folk medicines need not necessarily be replaced by modern one but the existing practice (if found safe) can be encouraged for the benefit of rural folk. Food-medicines overlap exhibited in many food cultures can be an interesting area of investigation.

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