

A Literature Review on Medicinal Plants are using for the Management of the Snake bite in Traditional Medicine.

ABSTRACT

Background: The Traditional Medicine is being time tested and still caters to the health needs of the society and provides the health care through prophylaxis treatment and rejuvenation. Today the poisonous snake bites are the more threatening problems and significant amount of mortality as morbidity all over the world including Sri Lanka. The Medicinal Plants available locally and used widely by Traditional healers, therefore need attention in this aspect.

Aim: The goal of this study was to literature related review the important characters of medicinal plants which are using on management of snake bites in the Traditional Medicine.

Place and Duration of the study: This literature review was carried out unit of Siddha Medicine, University of Jaffna from April to June 2018.

Methodology:

Data were collected from the related authenticated text books and research articles. In this present study, morphology; habitat; the parts used; Siddha properties such as taste, potency and efficacy; pharmacological action; number of plants which are using as diet; poisonous plants and mode of administration for the selected 94 medicinal plants were reviewed.

Results:

The results showed that, among the 94 medicinal plants belonging 41 families were identified and the highest numbers of these plants were included in the Fabaceae, Cucurbitaceae and Apocynaceae families and the morphology is 25% (24) plants were herb and shrub and 45% (42) were natural habitat and 26% (31) and 24% (29), were used as root and leaves respectively. These plants contain siddha properties {bitter taste 48.14% (52); hot potency 70.32% (64) and pungent efficacy 72.34% (68)}; pharmacological actions {diuretic 38.3% (36), tonic 37.23% (35), and astringent 35.1% (33)}; 53.19% (50) plants were used as external & internal medication in the management of snake bite.

Conclusion:

Although this literature review can be provide useful documentation for the management of the snake bite in Traditional Medicine, further extensive scientific studies should be carried out in future.

Keywords: Medicinal plants; management; review; snake bite; traditional medicine.

1. INTRODUCTION

Traditional Medicine comprises medical aspect of Traditional knowledge that developed over generations within various societies before the era of modern medicine [1]. It is termed Alternative medicine, Complementary Medicine, and Indigenous Medicine in many countries [2]. The World Health Organization (WHO) defines traditional medicine as "the sum total of the knowledge, skills and practices based on theories, beliefs and experiences indigenous to different cultures, whether explicable / not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness" [2].

Snake envenomation is an important global health issue. It constitutes an occupational hazard mainly in the field of agriculture [3]. The number of snake bites that occur each year may be as high as 5 million. They result in about 2.5 million poisoning and 20,000 to 125,000 deaths in the world [4]. Around 294 species of snakes are found in the world and 96 are live in Sri Lanka, of these 50 species are endemic to the Island. There are 13 species sea snakes and 10 species are blind snakes found in Sri Lanka [5]. Around 5 species of snakes are venomous such as King Cobra, Common Cobra, Common Krait, Russell's Viper and Saw Scaled Viper [6, 7] and these are very dangerous for 98% of the human deaths in Sri Lanka [5].

All traditional healing system, the plant kingdom has been a favorite source of medicine. In the world 70%-80% of the region has used herbal treatment for primary health care [2]. The plant kingdom provides an alternative to anti snake venom. Medicinal plants have been used as folk medicine for the management of snake bites [3].



Globally Traditional Physicians are practicing herbal medicine to cure snake envenomation; however the practice is not really recognized by modern medicine. The few scientific studies are done for evaluating the medicinal plants against the snake bites. This literature review is an attempt to produce documentation and awareness of the numerous herbal materials which are using for the management of snake bite in Sri Lanka [3].

2. METHODOLOGY

2.1. Study Design

It is a literature review related study.

2.2. Place and Duration of the study

This literature review was carried out unit of Siddha Medicine, University of Jaffna from April to June 2018.

2.3. Data Collection

Data were collected from the related past and recent text books, websites, proceedings, research articles and other documents from Jaffna/ Sri Lanka in order to identify the relevant information's on the medicinal plants which are using on management of snake bites in the Traditional Medicine [15-63]. For this purpose 94 medicinal plants which were mentioned in the text books were reviewed. The plants names (Scientific, Sanskrit, English, & Tamil), families, morphology of the medicinal plants (herb, shrub, climber, tree, creeper & aquatic), habitats (natural, cultivated, & ornamental), the specific parts used, Siddha properties such as taste, potency and efficacy, specific pharmacological action, number of plants which are using as diet, poisonous plants and mode of administration (internal & external) for the 94 selected medicinal plants were recorded. Most information's were obtained from the text books which were available in the Library/ Unit of Siddha Medicine, University of Jaffna.

2.4. Statistical Analysis

Collected data were processed and statistically analyzed by simple statistical method using Ms. Excel 2010.

3. RESULTS AND DISCUSSION

3.1. Taxonomic Position of the Medicinal plants

Selected 94 plant species belonging to 42 plant families were documented as remedies for management of snake bite. The taxonomic positions of individual plants which are using for the management of the snake bite are summarized in the Table 1. Plant taxonomy is the science that finds, identifies, describes, classifies, and names of plants [8].

Table 1. Taxonomic Position of the Medicinal plants

No	Botanical name	Sanskrit name	English name	Tamil name
01	<i>Indigofera tinctoria</i>	Nilini	Indian Indigo Plant	Avuri
02	<i>Alangium salvifolium</i>	Amkolam	Sage leaved Alangium	Alingil
03	<i>Corallocarpus epigaeus</i>	Mahamulam	Broyoms	Aakasakerudan
04	<i>Aristolochia bracteolata</i>	Ajaspurisaha	Worm Killer	Aadutheendapalai
05	<i>Cinnamomum verum</i>	Twak	Cinnamon	Karuva
06	<i>Aristolochia indica</i>	Ishwari	Indian birth wort	Perumarunthu
07	<i>Purgularia daemia</i>	Pahala antaka	Dogs bane white low plant	Uthamakaani
08	<i>Acalypha indica</i>	Arittamanjarie	Indian acalypha, Catsstruggle	Kuppaimeani
09	<i>Calotropis gigantean</i>	Arka	Mudar, Gigantic swallow wort	Arukkan
10	<i>Piper nigrum</i>	Maricha	Black pepper	Milaku
11	<i>Tylophora indica</i>	Kondaichaali	Vomiting swallow wort	Nanjaruppan
12	<i>Polygala glabra</i>	Meradu	Milk wort	Sriyaalnangai

13	<i>Polygala elongate</i>	Periyankank	Snake root	Periyaalanganai
14	<i>Luffa acutangula</i>	Kosavathe	Ribbed luffa	Peaipeerku
15	<i>Acorus calamus</i>	Vacha	Sweet flag	Vasambu
16	<i>Allium cepa</i>	Pallandu	Onion	Vengaayam
17	<i>Pavatta indica</i>	Pappans	Indian pellet shrub	Pavattai
18	<i>Pongamia pinnata</i>	Karanja	Indian beech	Pungu
19	<i>Momordica charantia</i>	Karavalli	Bitter gourad	Paakal
20	<i>Croton tiglium</i>	Danthi	Purging croton	Nearvaalam
21	<i>Lagenaria siceraria</i>	Alabu	Bottle gourd	Surai
22	<i>Citrullus colocynthis</i>	Indra varuni	Colocynthal fruit of bitter	Aatruthummatti
23	<i>Phyllanthus amarus</i>	Bhumygmakali	Indian phyllanthus	keelanelli
24	<i>Gynandropsis gynandra</i>	Vivitham	Spiderwisp	Thaivealai
25	<i>Datura metal</i>	Datura	Dhatura,Throne apple	Umathai
26	<i>Alternanthera sessilis</i>	Meenakshi	Sessile plant	Ponnankaani
27	<i>Leucas aspera</i>	Dronapush	Thumbe	Thumbai
28	<i>Nicotiana tabacum</i>	Tamarakuta	Tobacco	Pukaillai
29	<i>Allium sativum</i>	Lesuna	Garlic	Ulli
30	<i>Piper betel</i>	Nagavalli	Betel leaf	Vetrillai
31	<i>Sarcosemma brevistigma</i>	Somavalli	Moon plant	Kodikalli
32	<i>Albizia lebeck</i>	Shirisha	Srissa tree	Vaakai
33	<i>Azadirachta indica</i>	Nimba	Margose tree	Vembu
34	<i>Hemidesmus indicus</i>	Sariba	Indian sarasaparilla	Nannari
35	<i>Rhinacanthus nasuta</i>	Yathikapurni	-	Anichai
36	-	-	-	Ninraartchinunki
37	<i>Moringa olifera</i>	Siguru valkalum	Horse radish	Murunkai
38	<i>Ocimum sanctum</i>	Thulasi	Holy basil , Sac red basil	Thulasi
39	<i>Zingiber officinale</i>	Nagaram	Dried ginger	Sukku
40	<i>Ziziphus oenoplica</i>	Kakoli	Jackal jujube	Surai
41	<i>Madhuca longifolia</i>	Madhuka vriskhaha	The narrowed leaved mohua , Mowa tree	Iluppai
42	<i>Curculigo orchioides</i>	Musali	Black musale	Nilappanai
43	<i>Cocus nucifera</i>	Narikela	Coconut tree	Thennai
44	<i>Cissampelos pareria</i>	Patha	Velvet leave	Ponmusuttai
45	<i>Prosopis spicigera</i>	Sami	Indian Mesquite	Vanni
46	<i>Cissus quadrangularis</i>	Asthisamhari	Bone selter	Pirandai
47	<i>Tacca pinnatifida</i>	Vana surana	Wild amorphophalus	Kaatu karunai
48	<i>Spheranthus indicus</i>	Mundi	East Indian Globe Thistle	Kottaikaranthai
49	<i>Clitoria ternatea</i>	Shankha pushpa	Butterfly pea	Kaakanavan
50	<i>Mimosa elengi</i>	Vakula	Pointed leaved ape flower	Makizh
51	<i>Ferula asafetida</i>	Hingu	Asafoetida	Perunkaayam
52	<i>Abutilon indicum</i>	Kanka tika	Indian mallow	Thuthi
53	<i>Punica granatum</i>	Shukhdana	Pomaganatum.	Maathulai
54	<i>Toddalia asiatica</i>	Kanchana	Forest pepper	Mulakaranai
55	<i>Tinospora cordifolia</i>	Guduchi	Heart leaved moon seed	Seenthil
56	<i>Withania somnifera</i>	Aswagandha	Winter cherry	Amukkira
57	<i>Sesamum indicum</i>	Tilam	Gingili oil plant	Ellu
58	<i>Strychnos potatorum</i>	Kataka	Clearing nut tree	Theatraan
59	<i>Strychnos nux vomica</i>	Kulaka	Nux vomica	Etti
60	<i>Achyranthes aspera</i>	Apamarga	Rough chaff	Naayuruvi
61	<i>Physalis minima</i>	Tankari	Cape gooseberry	Thakkaali
62	<i>Musa paradisiaca</i>	Kadali	The Plantain tree	Vaazhai
63	<i>Cynodon dactylon</i>	Durva	Barmuda grass	Arukampul
64	<i>Catunaregum spinosa</i>	Maanda	Emetic nut tree	Marukkarai
65	<i>Gymnema sylvestre</i>	Sarpadarushtrik	Periploca of the woods	Sirukurinjaan
66	<i>Alstonia scholaris</i>	Sapthaparna	Devil tree, Shaitan wood	Eazhilaipaalai
67	<i>Terminalia bellirica</i>	Vebeethaki	Beleric myrobalans	Thaanri
68	<i>Calophyllum inophyllum</i>	Punnagaha	Alexandrian laurel	Punnai
69	<i>Caesalpinia bonduc</i>	Kuberakshi	Bonduc nut	Kazhtchi
70	<i>Psoralea corylifolia</i>	Baakuchi	Babchi	Kaarbogarisi
71	<i>Amaranthus tricolor</i>	Marisa	Chinese spinach	Sirukeerai
72	<i>Oldenlandia umbellata</i>	Rajana	Chaya root	Impooral
73	<i>Portulaca oleracea</i>	Lonica	Garden purslane	Paruppukeerai
74	<i>Abrus precatorius</i>	Gunja	Crabs eye ,Cocks eye	Kunrimani
75	<i>Solanum trilobatum</i>	Alarka	Purple fruited pea egg	Thuthuvazhai
76	<i>Cassia senna</i>	Swarnamukhi	Country senna	Nilavaarai

77	<i>Citrus limon</i>	Jambira	Lime	Elumichai
78	<i>Aegle marmelos</i>	Bilra	Bael tree, Holy fruit tree	Vilvam
79	<i>Anamirta cocculus</i>	Garalaphala	Indian berry, Fish berry	Kakkollivirai
80	<i>Anoectochilus setaceus</i>	Vanasarpagandi	Bristy Anoectochilus	Oorchid
81	<i>Argemone Mexicana</i>	Brahamadandi	Mexican poppy	Bramadandu
82	<i>Biophytum reinwardtii</i>	Jalapushpa	Reinwardts tree plant	-
83	<i>Caryota urens</i>	Sritalah	Wine palm	Tippilipana
84	<i>Hibiscus abelmoschus</i>	Latakasturika	Musk mallow	Kasturivendai
85	<i>Horsfieldia irya</i>	-	Irya tree	Eeriya maram
86	<i>Maranta arundinacea</i>	Hulankiriya	Arrow root plant	Aruruttukkilangu
87	<i>Morinda citrifolia</i>	Tunnavu	Indian mulberry	Nuna
88	<i>Nelumbo nucifra</i>	Abja	Chinees water lily	Ambal
89	<i>Nymphaea lotus</i>	Alagandha	White Egyptian lotus	Allithamarai
90	<i>Ophiorrhiza mungos</i>	Bhiyangakshi	Indian snake root	Kirippundu
91	<i>Prunus cerasoides</i>	Charu	Himalaya cherry	-
92	<i>Tiliacora acuminata</i>	-	-	-
93	<i>Wissadula periplociflia</i>	Wisadooliya	-	Wisadooliya
94	<i>Zeuxine regia</i>	-	-	Orchid

3.2. Family Distribution of the Medicinal Plants

Families of the selected medicinal plants are showed in Table 2. According to that result, among the 94 medicinal plants belonging 41 families were identified and the highest numbers of these medicinal plants were included in the Fabaceae, Cucurbitaceae and Apocynaceae families. Furthermore, this review encompasses some plants that are rarely or less often used.

Table 2. Details of Family distribution of the Medicinal Plants

No	Family Name	Frequency	Percentage (%)
01	Fabaceae	9	9.60
02	Alangiaceae	1	1.06
03	Cucurbitaceae	6	6.38
04	Aristolochiaceae	2	2.12
05	Lauraceae	1	1.06
06	Asclepiadoideae	2	2.12
07	Euphorbiaceae	3	3.19
08	Apocynaceae	6	6.38
09	Piperaceae	2	2.12
10	Polygalaceae	2	2.12
11	Acoracea	1	1.06
12	Amaryllidaceae	2	2.12
13	Rubiaceae	5	5.31
14	Caparidaceae	1	1.06
15	Solanaceae	5	5.31
16	Amaranthaceae	3	3.19
17	Lamiaceae	3	3.19
18	Meliaceae	1	1.06
19	Acanthaceae	1	1.06
20	Moringaceae	1	1.06
21	Zingiberaceae	1	1.06
22	Rhamnaceae	1	1.06
23	Sapotaceae	2	2.12
24	Hypoxidaceae	1	1.06
25	Arecaceae	1	1.06
26	Menispermaceae	4	4.25
27	Vitaceae	1	1.06
28	Dioscoreaceae	1	1.06
29	Asteraceae	1	1.06
30	Apiaceae	1	1.06
31	Malvaceae	2	2.12
32	Lythraceae	1	1.06
33	Rutaceae	1	1.06
34	Pedaliaceae	1	1.06
35	Loganiaceae	2	2.12

36	Musaceae	1	1.06
37	Poaceae	1	1.06
38	Combretaceae	1	1.06
39	Calophyllaceae	1	1.06
40	Portulacaceae	1	1.06
41	Orchidaceae	2	2.12

A plant family is simply a collection of plants that share characteristics grouped together. Plants can be categorized by similar features, including overall appearance, seed groupings, flower shape, and more, to show their relationship to one another. Understanding how a particular species of plant relates to others within its family is important for all forms of growing and gardening because it can provide information about aspects of plant care [9].

3.3. Morphology of the Medicinal Plants

When considering the morphology of medicinal plants (Figure 2) the most widely used (in descending order) plants are herb 25% (24), shrub 25% (24), and tree 20.83% (20). Plant morphology is the study of the physical form and external structure of plants. This is usually considered distinct from plant anatomy, which is the study of the internal structure of plants, especially at the microscopic level. Plant morphology is useful in the visual identification of plants [10].

Morphology of Medicinal Plants

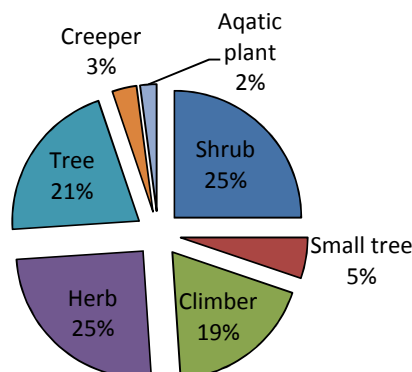


Fig. 1. Morphology of Medicinal Plants are using for Management of snake bite

3.4. Habitat of the Medicinal Plants

Figure 2 showed that, the habitats of the medicinal plants which are using in the management of the snake bite.

habitat of Medicinal Plants

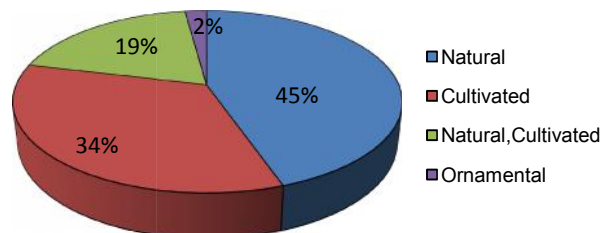


Fig. 2. Habitat of Medicinal Plants are using for Management of snake bite

In this review indicated that, 45% (42) medicinal plants are growing on natural habitat, 34% (32) plants are cultivated plants, and 19% (18) plants are natural and cultivated (Both).

3.5. Part uses of the Medicinal Plants

Important part uses for the management of the snake bite are showing in the Figure 3. The results revealed that roots are most commonly used for the management of snake bite with 26 % (31), followed by leaves 24 % (29), and the seeds 12% (15); however, there was latex and resin were used rarely.

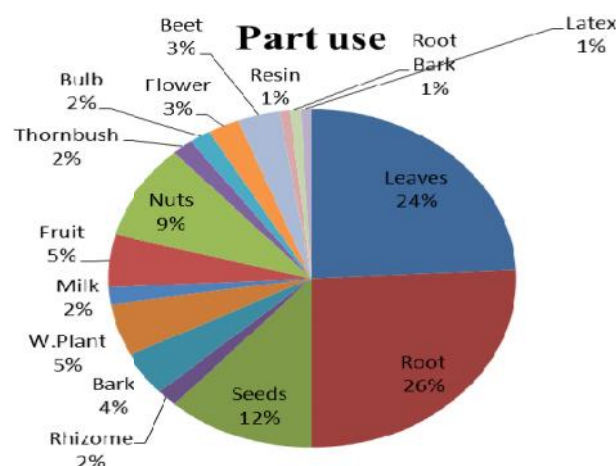


Fig. 3. Part uses of Medicinal Plants are using for Management of snake bite

Medicinal properties derived from plants may come from many different parts of a plant including leaves, roots, bark, seeds, fruit, and flowers. The parts of the plants are containing different active ingredients within a plant. Thus, one part of the plant could be toxic while another portion of the same plant could be harmless [11].

3.6. Siddha Properties of the Medicinal Plants

Table 3 is showing the siddha properties such as taste, potency and efficacy of the medicinal plants which are using the management of the snake bite.

Table 3. Siddha Properties of the Medicinal Plants

No	Taste	Fr.	%	Potency	Fr.	%	Efficacy	Fr.	%
01	Bitter	52	48.14	Hot	64	70.32	Pungent	68	72.34
02	Sweet	24	22.22	Cold	27	29.67	Sweet	26	27.65
03	Pungent	15	13.88						
04	Astringent	14	12.96						
05	Sour	03	02.77						

Fr. - Frequency; % - Percentage

According the table 3, these 94 medicinal plants contain siddha properties {bitter and sweet taste 48.14% (52) and 22.22% (24); hot potency 70.32% (64) and pungent efficacy 72.34% (68)}.

The drugs used in Siddha medicine were classified on the basis of five properties: taste, character, potency, class/ efficacy and action [12]. Taste has got significant place in Siddha Medicine. Tongue experiences these tastes when a drug is administered orally. The dynamics of Siddha preparations are based on taste parameters. Six tastes are known as sweet, sour, salt, pungent (spicy), bitter and astringent. Potency is described as active constituent of the drug. This constituent is responsible for pharmacological activity of the medicinal herb and other drugs. The drugs have cold and hot potency. Class (Bio transformation) is said to be the post absorptive taste or taste of the drug after absorption which also is considered to be an important aspect [13, 14].

3.7. Pharmacological Actions of the Medicinal Plant

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Table 4. Pharmacological action of Medicinal Plants

No	Pharmacological Action	Frequency	Percentage (%)
01	Stimulant	32	34.04
02	Antiperiodic	11	11.70
03	Germicide	02	02.13
04	Alterative	24	25.53
05	Anthelmintic	17	18.08
06	Diuretic	36	38.30
07	Emetic	20	21.27
08	Febrifuge	07	07.45
09	Laxative	30	31.91
10	Nauseant	03	03.19
11	Nutritive	17	18.08
12	Tonic	35	37.23
13	Purgative	20	21.28
14	Emmenagogue	12	12.77
15	Abortifacient	02	02.13
16	Carminative	16	17.02
17	Aphrodisiac	11	11.70
18	Expectorant	25	26.60
19	Antipyretic	02	02.13
20	Analgesic	01	01.06
21	Anti-inflammatory	09	09.57
22	Anodyne	08	08.51
23	Cathartic	03	03.19
24	Stomachic	19	20.21
25	Digestive	01	01.06
26	Rubefacient	11	11.70
27	Deodorant	01	01.06
28	Diaphoretic	08	08.51
29	Antidote	13	13.83
30	Acrid	01	01.06
31	Anti-bilious	05	05.34
32	Demulcent	19	20.21
33	Disinfection	10	10.64
34	Blood purificator	01	01.06
35	Astringent	33	35.11
36	Cooling	17	18.08
37	Anti-spasmodic	11	11.70
38	Antiseptic	16	17.02
39	Sialagogue	01	01.06
40	Galactagogue	03	03.19
41	Styptic	10	10.64
42	Emollient	05	05.34

159 The specific pharmacological actions of the medicinal plants which are using the management of the
 160 snake bite were listed in the table 4. According to this table, the pharmacological actions {diuretic
 161 38.30% (36), tonic 37.23% (35), astringent 35.11% (33) and stimulant 34.04% (32)}; are highly
 162 present in the medicinal plants which are using the management of the snake bite.

163 Action is the function of the drug which mentions the outcome effect of the drug like expectorant,
 164 tonic, diuretic etc. A drug can have more than one action [13, 14].

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166 **3.8. Dietary and Poisonous plants**

The figure 4 revealed that, 41.49% (39) plants are commonly used as diet and 9.57% (9) plants are poisonous plants in these 94 medicinal plant species.

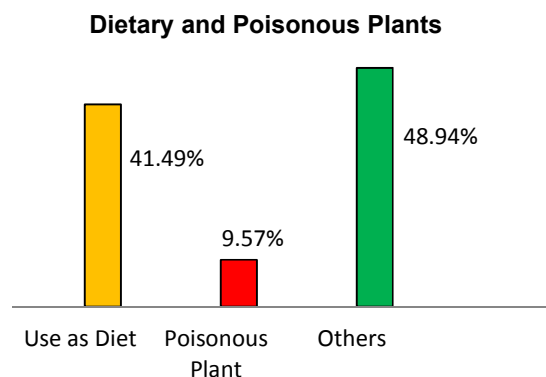


Fig. 4. Dietary and Poisonous plants

3.9. Mode of Administration

Modes of administration of the selected medicinal plants are showing in the Figure 5.

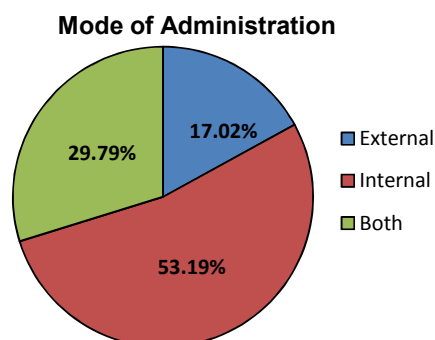


Fig. 5. Mode Administration of the Selected Medicinal Plants

This review confirmed that, the most of these selected medicinal plants 53.19% (50) were used as external and internal (Both) medication in the management of snake bite. Commonly, Siddha system classifies all medicinal preparations into 64 categories, of which 32 are internal medications and 32 are external medications and methods [13, 14]. A review of some of the more commonly used dietary supplements and their chemistry and topical use confirms that there is merit in using these plants both internally and externally [15].

CONCLUSION

Although this literature review can be provide useful documentation for the management of the snake bite in Traditional Medicine, further reviews related to the chemical composition, chemical elements, phytochemicals, physicochemical properties, toxic substances and extensive scientific studies also should be carried out in future.

ETHICS APPROVAL

It is not applicable.

CONSENT

It is not applicable.

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APPENDIX

No	Morphology	Common part use	Part use on Snake bite	Mode of administration	Used as Diet	Poisonous plant
01	Shrub	Leaves ,Root	Leaves, Root	External & Internal		
02	Small tree	Leaves ,Seeds ,Bark	Leaves, Seed	External		
03	Climber	Root ,Rhizome, Whole plant	Rhizome	External & Internal		
04	Climber	Leaves ,seeds, Root ,Whole plant	Root	External & Internal		
05	Small tree	Leaves ,Bark	Bark	Internal	✓	
06	Climber	Leaves ,Root, Rhizome	Leaves	Internal		
07	Climber	Leaves, Whole plant	Leaves , Whole plant	External & Internal		
08	Herb	Leaves, Root, Whole plant	Leaves, Root	Internal		

09	Shrub	Leaves, Root, bark, Flowers, Milk	Leaves, Milk	External & Internal		✓
10	Climber	Fruits	Fruits	External & Internal	✓	
11	Climber	Rhizome, Whole Plant, Seed	Seeds	Internal		
12	Shrub	Leaves, Whole plant	Leaves	Internal		
13	Shrub	Leaves, Whole plant	Leaves	Internal		
14	Climber	Leaves, Root, Seeds, Nuts , Fruit, Matured Fruit	Leaves, Seed, Nuts, Thorn bush	External & Internal	✓	
15	Herb	Root, Rhizome	Root	External & Internal		
16	Herb	Leaves, Flowers, Seeds, Bulb	Bulb	Internal	✓	
17	Shrub	Leaves, Root, Fruit	Leaves	Internal		
	Tree	Leaves, Root, Seeds, flowers	Root ,Seeds	Internal		
19	Climber	Leaves, Seeds, Fruit	Leaves	Internal	✓	
20	Tree	Seeds, Nuts	Nuts	Internal		✓
21	Creeper	Leaves, Seeds, Fruit, stem	Fruit	External	✓	
22	Creeper	Root ,Seeds, Fruit, Matured Fruit	Root	External		
23	Herb	Whole Plant, Root	Root	External		
24	Herb	Leaves , Whole Plant	Whole plant	Internal	✓	
25	Shrub	Leaves ,seeds, Fruit, Flowers	Leaves	External		✓
26	Herb	Leaves	Leaves	Internal	✓	
27	Shrub	Leaves ,Flowers	Leaves	External & Internal		
28	Shrub	Leaves	Leaves	Internal		✓
29	Herb	Bulb	Bulb	Internal	✓	
30	Climber	Leaves	Leaves	Internal		
31	Climber	Matured leaves ,Milk	Milk	External		✓
32	Tree	Leaves , Root, Bark, Root bark, Seeds, Resin, Flowers	Flowers	Internal		
33	Tree	Leaves ,Tender, Flowers, Fruit, Seeds, Bark, Root bark, Wood, Resin	Seeds	Internal	✓	
34	Shrub	Root	Root	Internal	✓	
35	Shrub	Leaves ,Root	Leaves	Internal		
36	Herb	Whole plant	Whole plant	Internal		
37	Tree	Leaves ,Seeds, Flowers, Bark, Tender, Resin, Pods, Root, Whole plant	Leaves	External & Internal	✓	
38	Shrub	Leaves ,Seeds	Leaves	Internal		
39	Herb	Dry beet/Rhizome	Dry beet	External & Internal	✓	
40	Tree	Root ,Beet, Fruit	Root	External & Internal		
41	Tree	Leaves , Flowers, Fruit, Seeds, Root bark, Bark	Root, Palanggothu	External & Internal	✓	
42	Herb	Root ,Beet	Beet	Internal		
43	Tree	Leaves, Sprouting, Flowers, Spathe Fruit , Thorne bush, Root, Coconut shell, Bat, Whole plant	Root ,Thorne bush	Internal	✓	

44	Climber	Leaves ,Root	Root	Internal	✓	
45	Tree	Leaves ,Fruit, Bark	Leaves, Bark	External & Internal		
46	Creeper	Stem ,Root	Root	Internal	✓	
47	Herb	Beet	Beet	Internal	✓	
48	Herb	Leaves, Flowers, Seed, Root, Root bark, Whole plant		External		
49	Herb	Leaves ,Seeds, Root, Whole plant	W .Plant	External & Internal		
50	Tree	Seeds , Flowers, Bark	Seeds	Internal		
51	Shrub	Resin	Resin	Internal	✓	
52	Shrub	Leaves , Flowers, Root, Bark	Root	Internal	✓	
53	Small Tree	Flowers ,Pods, Fruit, Seeds, Root, Bark	Root	External & Internal	✓	
54	Shrub	Leaves ,Bark, Root	Root	External		
55	Climbing shrub	Leaves ,Stem, Root, Beet	Root	External & Internal	✓	
56	Shrub	Leaves ,Seeds, Root, Beet	Root, Beet	Internal	✓	
57	Shrub	Leaves ,Flowers, Seeds, Fruit	Seeds	External & Internal	✓	
58	Tree	Fruit ,Seeds	Fruit	Internal		
59	Tree	Leaves ,Fruit, seeds, Bark, Root Bark.	Seeds	External		✓
60	Herb	Leaves .Root, Whole plant	Leaves ,Root	External & Internal		
61	Shrub	Fruit , Whole plant, Root	Root	Internal	✓	
62	Tree /shrub	Leaves ,Flowers, Pods, Fruit, Bark ,Wood, Stem	Bark	External & Internal	✓	
63	Herb /Grass	Root , Whole plant	W .Plant	Internal	✓	
64	Small tree	Fruit ,Bark, Root	Root	External		
65	Climber	Leaves ,Root	Root	External & Internal	✓	
66	Tree	Bark ,Root	Root	Internal		
67	Tree	Leaves ,Fruit, Seeds	Seeds	External & Internal		
68	Tree	Leaves , Flowers, Seeds, Bark, Resin	Seeds	External & Internal		
69	Climbing Shrub	Leaves ,Seeds, Bark, Root, Root Bark	Seeds	External & Internal		
70	Herb	Seeds	Seeds	External & Internal		
71	Herb	Leaves ,Stem	Leaves	Internal	✓	
72	Herb	Leaves ,Root, Root Bark, Whole plant	Leaves ,Root	Internal	✓	
73	Herb	Leaves ,Seeds	Leaves	Internal	✓	
74	Climber	Leaves , Seeds, Root	Root	Internal		✓
75	Climber	Leaves , Flowers, Fruit, Whole plant t	Fruit ,Flowers	Internal	✓	
76	Shrub	Leaves	Leaves	Internal		
77	Shrub/ Climber	Leaves ,Fruit, Root	Root	Internal	✓	
78	Tree	Leaves , Flowers, Pods, Fruit	Root	Internal	✓	
79	Climber	Fruit , Bark, Seeds	Fresh bark	External		✓

80	Herb	W .Plant	W .Plant	External		
81	Herb	Seeds , Whole plant Milk	Seeds	External		✓
82	Small Tree	Leaves	Leaves	Internal		
83	Tree	Leaves ,Root Bark, <i>Spathe</i>	Root Bark	Internal	✓	
84	Shrub	Leaves ,Root, Seeds	Seeds	External & Internal		
85	Tree	Leaves ,Root, Latex	Latex ,Root	External & Internal		
86	Herb	Tuber ,Rhizome	Rhizome	Internal	✓	
87	Tree	Leaves ,Root, Tender leaves, Unripe berries, Charred, Stem bark, Fruit	Tender leaves	External	✓	
88	Aquatic plant	Flowers, Fresh root stock, Seeds, Rhizome.	Fresh root stock	Internal	✓	
89	Aquatic plant	Root stock ,Flowers, seeds, Fruit, Rhizome ,Leaves	Fruits	Internal		
90	Herb	Leaves ,Root	Root	Internal	✓	
91	Shrub	Bark, Fruit	Bark	External		
92	Herb	Bark, Root	Root	Internal		
93	Tree	Leaves, Whole plant	Leaves	External		
94	Herb	Leaves, Flowers	Leaves	External		

APPENDIX 1. Review Records of the Medicinal Plants which are using in the Management of the Snake Bite