



**ETHNOMEDICINAL PLANTS USED FOR TREATING POISONOUS BITES BY THE
KANI TRIBES OF KANYAKUMARI WILDLIFE SANCTUARY**

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ABSTRACT

An ethnobotanical survey was carried out among the Kani tribe residing in the foot hills of Southern Western Ghats of Tamilnadu, India. Poisonous bite is the most common among the tribal people due to lack of sanitation. Tribal communities still depend upon wild medicinal plants for meeting the primary healthcare needs. In the present study, a total of 48 medicinal taxa belonging to 43 genera and 28 families used for the treatment of poisonous bites by the kani tribe. These medicinal plants are used to treat different types of poisonous bites such as snake bite, scorpion bite, spider sting, honey bee sting, dog bite, leech bite.

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INTRODUCTION

Medicinal plants have been used for centuries as remedies for poisonous bites because they contain active components of therapeutic values. The World Health Organization has estimated that about 80% of the global population depend on traditional medicine to meet their primary healthcare needs (WHO, 2000). Herbal remedies form an integral part of healing and are considered to be the oldest forms of health care known to mankind on earth (Dangwal and Sharma, 2011). Ethnomedicine has thrived because of the cost-effectiveness, acceptability and biomedicinal benefits. There has been a huge growth in the demand for herbal medicines globally (Halile *et al.*, 2008), because there are major concerns about synthetic drugs - expensiveness, side effects and toxicity (Sandhya *et al.*, 2006). Kanis have a very wide knowledge of medicinal plants to meet their primary healthcare. They use herbal medicine to treat cough, cold, fever and poisonous bites. The wealth of knowledge of medicinal plants of the tribes is based on hundreds of years beliefs and observations. This knowledge has been transmitted from generation to generation. Nowadays, as these tribes are increasingly being exposed to the modern world, there is a danger of this invaluable knowledge being lost. This study aims to record the information on medicinal plants used by the Kani tribe of Southern Western Ghats for treating poisonous bites.

MATERIALS AND METHODS

Data Collection

Ethnobotanical data were collected on poisonous bites during 2015-2016, from all categories of Kani tribe interviewing medicine men, tribal headman, elderly persons. The survey was conducted through semi-structured open-ended interviews based on standard ethnobotanical methods (Martin, 1995; Alexiades, 1996).

Data collected included plant parts used, mode of preparation of each medication, mode of utilization, the disease each plant helps to cure, local name. Interviews were conducted in Tamil. Data collected included plant parts used, mode of preparation of each medication, mode of utilization, the disease each plant helps to cure and local name.

Plant Collection and Identification

Plant samples were collected by walking in the forest. Some of the plants were identified in the field itself. Photographs were taken. During collection the taxa were classified according to their habit: herb, shrub, tree, liana and climber. Plant samples were collected for the preparation of voucher specimens. Voucher specimens were deposited in the Department of Botany and Research Centre, Scott Christian College, Nagercoil. The Angiosperm Phylogeny Classification (APG 111, 2009) was followed to classify the taxa. The plant specimens were identified with the help of local and regional floras (Gamble and Fischer, 1956; Nair and Henry, 1983). In order to check the spelling, eliminate the use of older synonyms and ensure uniform nomenclature all plant names were verified using The Plant List (2013).

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RESULTS AND DISCUSSION

The present study identified a total of 48 medicinal plants belonging to 43 genera and 28 families used for the treatment of poisonous bites. All the 28 families belonged to angiosperms. Among angiosperms, dicotyledons were represented by 22 families, 36 genera and 40 taxa, monocotyledons by 6 families, 7 genera and 8 taxa. Of the 40 dicot taxa, 15 were Polypetalae belonging to 13 genera and 11 families; 15 were Gamopetalae belonging to 15 genera and 8 families and 10 were Monochlamydeae belonging to 8 genera and 3 families. Monocots were represented by 8 taxa belonging to 7 genera and 6 families (Table 1).

Table 1 Floristic richness of ethnomedicinal taxa

Floristic group		Genus	Taxa	Family
Angiosperms				
Dicotyledons	Polypetalae	13	15	11
	Gamopetalae	15	15	8
	Monochlamydeae	8	10	3
Monocotyledons		7	8	6
		43	48	28

Family abundance

The abundance of taxa per family ranged from one taxon to five taxa. The best represented families were Euphorbiaceae (5 taxa), followed by Apocynaceae (4 taxa), Lamiaceae (3 taxa), Aristolochiaceae, Asclepiadaceae, Leguminosae, and Zingiberaceae (2 taxa), Asteraceae, Boraginaceae, Loganiaceae, Oleaceae, Pedaliaceae, Amaranthaceae, Combretaceae, Crassulaceae, Lecythidaceae, Leguminosae, Nelumbonaceae, Oxalidaceae, Polygalaceae, Rutaceae, Vitaceae, Asparagaceae, Araceae, Dioscoreaceae, Iridaceae and Poaceae with one taxon.

Habit of medicinal plants

Kanis use herbs predominantly for medicine preparation. Of the collected ethnomedicinal plants, 27 (56%) were herbs followed by shrubs 12 (25%), trees 8 (11%) and climbers 4 (8%). Herbs have been used as medicine since time immemorial in all cultures (Barnes *et al.*, 2007; Namukobe *et al.*, 2011; Shrestha *et al.*, 2016). This tradition is still being followed as herbs are abundant in the surrounds of tribal settlements (Uniyal *et al.*, 2006; Modak *et al.*, 2015). Kanis dwell in deep impenetrable tropical forests. But they clear the forests for cultivation and shelter. This facilitates gaps in the canopy of these tropical forests, favouring the diffusion of sunlight to the forest floor; the humus-rich soil and microclimatic conditions support the luxuriant growth of herbs in these patches. Disturbance favours gap formation (Laloo *et al.*, 2006) and herbaceous taxa, either cultivated or weeds, are commonly seen in disturbed areas. Another factor favouring the herbs is their ease of collection and immediate availability (Voeks, 1996). Shrestha *et al.* (2014) implied that usually in the higher altitudes zone, herbs and shrubs take dominance over trees. The higher percentage of herbs used as medicine could be because Kani tribal settlements are situated in high altitudes regions. The findings are in line with those of studies carried out in India and elsewhere; the Santal tribe of West Bengal prefers herbs for medicinal preparation (Shah *et al.*, 2016; Santana *et al.*, 2016). Around the world, Baganda, Banyarwanda, Bagiso tribes of Uganda (Tugume *et al.*, 2016), Tharu and Magar tribes of Nepal (Singh *et al.*, 2012) to prefer herbs. In India too, the Bhangali tribe of Chotta Bhangal (Uniyal *et al.*, 2006),

Apatanis of Arunchal Pradesh (Kala, 2005), Godabas of Odisha (Smita *et al.*, 2012), Tharus of Dudhwa National Park, Uttar Pradesh (Kumar and Bharati, 2014) are reported to use herbs as medicine predominantly. Tribes of Tamilnadu also prefer herbaceous plants: Malayalis (Silambarasan and Ayyanar, 2015), Irulas (Dhatchnamoorthy *et al.*, 2013; Kalaiselvan and Gopalan, 2014), and Todas (Sharmila *et al.*, 2014).

Plant parts used for medicine preparation

Kanis use all parts of the plant for medicine preparation. Among the plant parts, leaf is the widely used by the tribes for medicine preparation. This is followed by the fruit, bark, root, tuber, flower, rhizome, seed and bulb. Leaves are the most frequently used plant part, accounting for 23 taxa (48%), followed by root 13 taxa (27%), bark 2 taxa (5%), fruit, rhizome, seed, tuber each with 2 taxa (4%), bulb and flower 1 taxa each (2%). Leaves can be collected easily from the forest (Giday *et al.*, 2009). The high use of leaves might be attributed to the fact that they can be easily obtained in large quantities when compared with other plant parts (Passalacqua *et al.*, 2007). Another reason is that using leaves is very easy when compared with using other plant parts. Leaves are the most vulnerable parts of plants and therefore contain more bioactive secondary compounds to help them defend themselves from herbivores (Bhattarai *et al.*, 2006). Gathering of leaves is more sustainable than that of underground parts, stem, bark or entire plant (Giday *et al.*, 2003). Leaf is the major site of photosynthesis and is the most metabolically active part of the plant. They are the sites of various biochemical reactions, leading to the production of secondary metabolites, which contribute towards their medicinal value (Balick and Cox, 1996). The fact that leaves are used by the Kani for treating various ailments has been substantiated by the findings among various other tribes in India and elsewhere. Tharu tribes of Dudhwa National Park (Kumar and Bharati, 2014). In Tamilnadu too, Kuravas and Irulas of Villupuram district (Arulappan *et al.*, 2015), Paliyars and Malayali Gounders (Vaidyanathan *et al.*, 2014) use leaves for preparing medicines to cures various ailments

Mode of preparation

Kani tribes prepare medicine in different forms. They are grouped into 4 categories. Of these, most commonly used method of preparation was paste [38 taxa (79%)], followed by extract [6 taxa (13%)], decoction [2 taxa (4%)], oil [2 taxa (4%)]. *Paste* is prepared by grinding the fresh or dried plant parts with water. *Decoction* is obtained by boiling plant parts in water until the volume of water is reduced to a certain amount, which is then decanted. *Extract* is prepared by crushing the plant parts water. The filtrate obtained is the extract. Oil is prepared by boiling the plant extract in coconut oil. Water is commonly used as the solvent for the preparation of medicines. Pastes are prepared predominantly by various tribes; Valaiyans of Dindigul district (Yasothkumar and Rajendran, 2016) and Kurumbas and Kurichans of Dharmapuri district (Alagesaboopathi, 2014).

Mode of application

Kanis prefer three types of application of medicine: topical, oral and inhalation. The most common route of application is oral [25 reports (52%)], followed by topical [23 reports (48%)].

Table 2 List of ethnomedicinal plants used by the Kani tribe for treating poisonous bites

Sl. no	Binomial	Local name	Family	Parts used	Habit	Mode of preparation	Ethnomedicinal preparation	Threapeutic action/ disease it cures	Application
1	<i>Achyranthes aspera</i> L.	Nairuvi	Amaranthaceae	Leaf	Herb	Paste	A handful of fresh leaves are made into paste with water. Paste applied externally on the spot once in a day for three days for treating dog bite. Extract is also taken orally	Dog bite	Oral
2	<i>Anaphyllum wightii</i> Schott.	Keeri kizhaghu	Araceae	Tuber	Herb	Paste	Tuber paste is applied externally against snake bite. Tuber made into paste along with the roots of <i>Aristolochia indica</i> and <i>Rauwolfia serpentina</i> ground into fine paste given orally for thrice a day for 12 days.	Snake bite	Topical
3	<i>Anisomeles malabarica</i> (L.) R.Br. ex Sims	Perumthumbai	Lamiaceae	Leaf	Herb	Extract	Leaf extract mixed with leaf extract of <i>Polygala arvensis</i> given orally against snake bite.	Snake bite	Oral
4	<i>Aristolochia bracteolata</i> Lam.	Adutinnapai	Aristolochiaceae	Root	Herb	Paste	Root ground into paste and mixed with 100 ml of cow's milk and given orally for thrice in a day against snake bite.	Snake bite	Oral
5	<i>Aristolochia indica</i> L.	Siria kiridan	Aristolochiaceae	Root	Herb	Paste	The root is crushed into paste with little water and paste is applied topically over affected part of snake bite and decoction is given once in a day for three days.	Snake bite	Topical
6	<i>Aristolochia tagala</i> Cham.	Karuda kodi	Aristolochiaceae	Root	Shrub	Paste	Roots (50 gm) ground into paste. with water and paste is applied over the affected part of snake bite. Handful of roots boiled in water along with the roots of <i>Rauwolfia serpentina</i> . This decoction is consumed twice a day for seven days orally to cure the poisonous effect of snake bite.	Snake bite	Oral
7	<i>Biophytum sensitivum</i> (L.) DC.	Nila tenghu	Oxalidaceae	Leaf	Herb	Paste	Leaf ground into fine paste applied topically over the swellings caused by wasp and bee honey bee stings.	Bee bite	Topical
8	<i>Bryophyllum pinnatum</i> (Lam.) Oken	Chodakku chedi	Crassulaceae	Leaf	Herb	Extract	Leaf juice is applied externally over stinged spot. 10ml of this juice is given orally cures bee stings	Bee sting	Topical
9	<i>Calotropis gigantea</i> (L.) R.Br.	Erukku	Asclepiadaceae	Leaf	Shrub	Paste	Leaves (20 g) ground into fine paste mixed with honey once in a day given orally against snake bite.	Snake bite	Oral
10	<i>Careya arborea</i> Roxb.	Pelumaram/Kalaikombu	Lecythidaceae	Bark	Tree	Extract	Bark extract applied in legs remove leech.	Leech	Topical
11	<i>Cassia fistula</i> L.	Kattu konnai	Caesalpiniaceae	Bark	Tree	Decoction	Handful of bark together with the leaves of <i>Polygala arvensis</i> made into decoction with 50 ml of water given orally thrice in a day for three days against snake bite.	Snake bite	Oral
12	<i>Cayratia pedata</i> (Lam.) Gagnep.	Ivaralli	Vitaceae	Root	Climber	Paste	Leaves made into paste and applied topically on the bitten part for treating scorpion sting.	Scorpion sting	Topical
13	<i>Croton bonplandianus</i> Baill.	Neer nachu	Euphorbiaceae	Leaf	Herb	Paste	A handful of fresh leaves are made into paste with little water. The paste (25 g) is given orally once in a day. This paste is applied topically on the spot once in a day for five days for treating rabid dog bite.	Dog bite	Topical
14	<i>Datura metel</i> L.	Ummathai	Euphorbiaceae	Seeds	Shrub	Oil	Tribal men when going into the forest apply castor oil, repel leech from the body	Leech	Topical
15	<i>Dioscorea alata</i> L.	Kachill	Dioscoreaceae	Leaf	Climber	Paste	Handful of leaves is made into paste. This paste is applied topically over bee stinged spot.	Bee bite	Topical
16	<i>Dioscorea tomentosa</i> Koen. Ex & Spreng	Nooli kizhangu	Dioscoreaceae	Tuber	Herb	Paste	Corm mixed along with the leaves of <i>Cassia occidentalis</i> and made paste applied topically over spot cures poisonous insect stings.	Insect sting	Topical
17	<i>Eclipta prostrata</i> (L.) Mant.	Karislankanni	Asteraceae	Leaf	Herb	Extract	Leaf juice (20 ml) is mixed with the cup of cow's milk twice a day cures snake bite poison.	Snake bite	Oral
18	<i>Eleutherine palmifolia</i> (L.) Merr.	Vever venghayam/ vishanarayani	Iridaceae	Bulb	Herb	Paste	Tuber is made into paste and applied on the bitten area and also given orally immediately after snake bite. It is an antidote for snake bite.	Snake bite	Oral
19	<i>Euphorbia ligularia</i> Roxb.	Illaikazhi	Euphorbiaceae	Root	Herb	Paste	Handful of roots ground along with the <i>Piper nigrum</i> fruits is applied topically on the snake bitten area.	Snake bite	Topical
20	<i>Heliotropium indicum</i> L.	Telkodukku	Boraginaceae	Leaf	Herb	Paste	Handful of leaves made into paste and applied topically over spot to cures poisonous insect stings.	Insect sting	Topical
21	<i>Hemidesmus indicus</i> (L.) R.Br.	Nannari	Asclepiadaceae	Root	Climber	Paste	Equal quantities of roots along with the roots of <i>Polygala arvensis</i> is ground into fine paste. The paste is given orally against snake bite.	Snake bite	Oral
22	<i>Heteropogon contortus</i> (L.) P. Beauv. Ex Roem & Schultes	Kudraivalipull	Poaceae	Root	Herb	Paste	Roots washed and made into paste. 10 g of this powder is mixed with honey and given orally twice in a day for three days for treating rabid dog bite.	Dog bite	Oral
23	<i>Indigofera tinctoria</i> L.	Avari	Fabaceae	Root	Shrub	Paste	Root (50 g) are made into fine paste given orally thrice a day against scorpion sting.	Scorpion sting	Topical
24	<i>Jasminum augustifolium</i> (L.) Willd.	Kattumalligai	Oleaceae	Root	Shrub	Extract	Juice of the root is mixed with honey given orally for thrice a day for three days against snake bite.	Snake bite	Oral
25	<i>Jatropha curcas</i> L.	Amanaku	Euphorbiaceae	Leaf	Shrub	Paste	Handful of leaves are ground into paste along with the fruits of <i>Piper nigrum</i> given orally two times a day for three days against snake bite.	Snake bite	Oral
26	<i>Kaempferia galanga</i> L.	Kacholam	Zingiberaceae	Rhizome	Herb	Paste	Rhizome made into paste along with the leaves of <i>Polygala arvensis</i> given orally for four times in a day for fifteen days and also applied topically on the bitten area to cure snake bite.	Snake bite	Oral
27	<i>Leucas aspera</i> (Willd.) Link	Thumbai	Lamiaceae	Leaf	Herb	Paste	Handful of fresh leaves made into paste along with the roots of <i>Rauwolfia serpentina</i> , 5-10 gm of this paste is given orally for treating snake bite and scorpion sting.	Snake bite and Scorpion sting	Oral
28	<i>Murraya koenigii</i> (L.) Spreng.	Kariveppu	Rutaceae	Leaf	Shrub	Paste	A hand ful of leaves are made into paste with a little water. This paste is applied externally on the spot once in a day for five days for treating dog bite.	Dog bite	Topical

29	<i>Nelumbo nucifera</i> Gaertn.	Thamarai	Nelumbonaceae	Flower	Herb	Paste	One torus (receptacle of the flower) along with pistils (stigma, style and ovary) ground with little pepper and given orally twice a day for seven days as an antidote for snake bite.	Snake bite	Oral
30	<i>Ocimum tenuiflorum</i> L.	Thulasi	Lamiaceae	Leaf	Herb	Extract	Leaf crushed and extract is applied topically over mosquito bitten area.	Mosquito bite	Topical
31	<i>Pedaliium murex</i> L.	Yanai thuvurai	Pedaliaceae	Leaf	Herb	Paste	Handful of leaves along with the leaves of <i>Rhinacanthus nasutus</i> and <i>Piper nigrum</i> fruits ground into fine paste. Paste (20 g) is given orally thrice a day for three days against snake bite.	Snake bite	Oral
32	<i>Polygala arvensis</i> Willd.	Siriyanangai	Polygalaceae	Leaf	Herb	Paste	Leaves ground into paste along with the leaves of <i>Andrographis paniculata</i> applied topically for curing snake bite. About 10 ml leaf juice is given orally two times per day for three days to cure the poisonous effect of snake bite.	Snake bite	Topical
33	<i>Polygala javana</i> DC.	Periyanangai	Polygalaceae	Leaf	Herb	Paste	Handful of leaves pounded with leaves of <i>Polygala arvensis</i> made into paste, mixed with honey and given against snakebite.	Snake bite	Oral
34	<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz	Aval pori	Acanthaceae	Root	Herb	Paste	1. Leaf ground into paste with little water. This paste is applied over the affected part of beetle bitten area. 2. Roots of this plant pounded along with the roots of <i>Aristolochia tagala</i> (Karuda kodi) and mixed with 50 ml goat milk and given orally for three times per day. Paste is also applied topically over snake bitten area and over poisonous insect bitten spot.	Beetle bite/Snake bite/ Poisonous bits	Topical
35	<i>Rauwolfia tetraphylla</i> L.	Arochiya muligai	Apocynaceae	Root	Herb	Decotion	Decotion prepared along with the roots 20 gm each of <i>Aristolochia tagala</i> and <i>Thottea siliquosa</i> given orally for six times a day cures all types of poisonous bite and snake bite.	Poisonous bite/ Snake bite	Oral
36	<i>Rhinacanthus nasutus</i> (L.) Kurz	Nagamalli	Acanthaceae	Leaf	Shrub	Paste	About 100 g of leaves is ground into paste mixed with the cup of goat's milk given orally against snake bite	Snake bite	Oral
37	<i>Ricinus communis</i> L.	Amanaku	Euphorbiaceae	Seeds	Shrub	Oil	Tribal men when going into the forest apply castor oil, repel leech from the body	Leech	Topical
38	<i>Ruellia patula</i> Jacq.	Chilanthi pachilai	Acanthaceae	Leaf	Shrub	Paste	Leaf paste applied topically over spider bitten area (special species of spider known as Tiger spider)	Spider bite	Oral
39	<i>Sansevieria roxburghiana</i> Schult. & Schult.f.	Marul/ Naga pachhai	Agavaceae	Leaf	Herb	Paste	About 100 gm of roots ground along with the bulb of <i>Eleutherine palmifolia</i> , leaves of <i>Aristolochia tagala</i> , mixed with goat milk given orally twice a day for ten days as an antidote for snake bite.	Snake bite	Oral
40	<i>Senna alata</i> (L.) Roxb.	Yanai thuvurai	Caesalpiniaceae	Leaf	Herb	Paste	Leaf paste applied immediately over the scorpion bitten area	Scorpion bite	Topical
41	<i>Senna occidentalis</i> (L.)Link	Peythavarai	Caesalpiniaceae	Leaf	Herb	Paste	Leaves made into paste along with the leaves of <i>Rauwolfia serpentina</i> and <i>Aristolochia tagala</i> . 5 gm of this paste is applied topically affected areas of poisonous insect bites. Leaf paste is applied topically on the spot once in a day for three days to treat bee bite.	Poisonous bite/ Bee bite	Topical
42	<i>Strychnos nux-vomica</i> L.	Kanchirai	Loganiaceae	Fruit	Tree	Paste	Fruits ground into fine paste. Consume 10 gm is consumed with cow's milk two times per day for five days to cure snake bite.	Snake bite	Oral
43	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Tanikkai	Combretaceae	Fruit	Tree	Paste	Fruits ground along with the leaves of <i>Polygala arvensis</i> and <i>Encostemma axillare</i> along with human urine given orally against viper bite.	Snake bite	Oral
44	<i>Thottea siliquosa</i> (Lam.) Ding Hou	Kuravan Kanda mooli/ Kuttilai vianai	Aristolochiaceae	Root	Shrub	Paste	Root paste made into paste with human urine and applied on the bitten part as an antidote for scorpion bite/snake bite. Root extract 10 ml is given orally for five days for snake bite.	Scorpion bite/snake bite	Topical
45	<i>Thunbergia erecta</i> (Benth.) T.Anderson	Nilampari	Acanthaceae	Leaf	Shrub	Paste	1. Leaf paste applied topically on the bitten area.paste applied topically over spider bitten area. 2. Roots (50 g) ground into paste applied topically over the scorpion bitten area. The sting will fall out in the following day.	Spider bite and Scorpion bite	Topical
46	<i>Tylophora indica</i> (Burm. f.) Merr.	Nacharuthan	Apocynaceae	Root	Climber	Paste	1. Root paste given orally in empty stomach to remove all the poisonous waste from stomach (Kai visham). 2. Handful of roots along with the leaves of <i>Aristolochia indica</i> ground into paste and given orally as an antidote for snake bite.	Snake bite	Oral
47	<i>Wrightia tinctoria</i> (Roxb.) R.Br.	Veppalai	Apocynaceae	Leaf	Tree	Paste	Lraves are made into paste along with the roots <i>Euphorbia ligularia</i> given orally against snake bite	Snake bite	Oral
48	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Chenthikilangu	Zingiberaceae	Rhizome	Herb	Paste	Rhizome paste is applied over body prevents honey bee sting	Honey bee sting	Topical

Oral and topical mode of application is followed by the Kanis mainly for treating, poisonous bites. The finding that the topical mode of application of medicine is predominant among Kanis is concordant with, findings among various tribes in India and elsewhere: Baluchs of Iran (Sadeghi and Mahmood, 2014), Bhotias of Central Himalaya (Phondani *et al.*, 2010) and Malayalis of Western Ghats (Silambarasan and Ayyanar, 2015). Topical mode of application provides better action and also enhances the remedial power of herbal medicine (Mahmood *et al.*, 2012).

CONCLUSION

The present study concluded that Kani tribal living in remote areas depend mainly on medicinal plants used for treating poisonous bites. Due to their remoteness and inaccessible to modern medicine they depend on herbal medicines. The tribal people have acquired the knowledge about the medicinal plant which transferred from generation to generation. So it should be documented systematically and should be scientifically validated. This study possibly will open an opportunity for future pharmacological research works and also serves as reference for quantitative ethnobotany. Further research should

be done on the ethnogynaecological medicinal plants will guide to discovery of new bioactive compounds.

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