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An ethno-botanical survey of indigenous medicinal plants and their use by tribal people of Pathukani, Kanyakumari district in Tamil Nadu, India

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Abstract
Plants have been used for health care at family circle level both in processed and un- processed form since remote past. Indigenous knowledge lay out basis for local level decision making in natural resources conservation in rural communities. However, until recently little has been done to explore for indigenous knowledge applied in care medicinal plants. In fact, the present study was the first set out to explore medicinal plants of Pathukani, Kanyakumari district in Tamil Nadu, India. This paper pen drive to focus on indigenous knowledge used in natural resources; particularly medicinal plants in local tribal people of Pathukani, Kanyakumari district in Tamil Nadu, India. Results revealed that, selective harvesting of medicinal plant parts was popular by 94% of the respondents, followed by practice of medicinal plant species. The study findings indicated that fifty plant species belonging to 46 genera and 27 families are documented that are used by the Kani people. Plant species of Solanaceae is predominantly used, followed by Apocynaceae, Lamiaceae, Malvaceae etc. All of the species grow wild. The traditional herbal healers quiet frequently uses leaves (19) followed by root (13), whole plant (11), fruit (6), seed (2), epicarp, latex and bulb (1 each). The most common method of drug preparation and application is the paste form (24 out of 86 applications), followed by decoction (19 applications), powder (8 applications) poultice and juicer (1 application each). To conclude, the defendant showed to possess sound indigenous knowledge on conservation and their knowledge varied based on their socio-demographic attributes. In view of these findings, the study recommends for safe guarding and furtherance of aboriginal knowledge of conservation across the community. Likewise, there is a need of disseminate indigenous knowledge on conservation by the elders to the youth. It was concluded that study area is rich in medicinal plants species and corresponding traditional knowledge. However, pull up the entire plant for ethno-medicine is a big warning to conservation of medicinal plants diversity in the study area.

Keywords: conservation, ethno-medicine, indigenous, socio-demographic and traditional knowledge

Introduction
India, one of the richest floristic regions of the world has variegated socio economic, ethnic, linguistic and cultural areas. Therefore, the indigenous knowledge of medicinal plants and their use in treating illness might reasonably be expected in this country. The knowledge of medicinal plants in India has been assembling in course of many centuries based on several primeval medicinal systems, including ayurveda, unani and siddha (Lone and Bhardwaj, 2013) [18]. World Bank Report has shown twenty percent of medicines as contribution from 'Indigenous Knowledge World'. Nearly seventy-five per cent of the 121 plants derived prescription drugs used global were discovered following steer from herbal remedies (Paul and Ramanathan, 2002) [23].
Many research studies have been conducted on the documentation of indigenous knowledge of native medicinal plants for healthcare purposes by the local communities of Pakistan (Shehzad and Qureshi, 2001; Saghir *et al*., 2001; Dar, 2003; Ajaib *et al*., 2010) [30, 27, 6, 1] However, there is dearth of information on ethno-medicinal uses of plants from study area. Therefore, this study was conducted to search and document the indigenous knowledge of medicinal flora of selected and to recommend a good management and conservation plan for medicinal plant diversity in study regions. According to Augustino and Gillah (2015) [3] there is a link between indigenous knowledge and the management of environment in which medicinal plants grow. This means the unceasing of medicinal plants is in the hand of the community basing on their knowledge about the use and importance of them. One of the key factors behind this pace of losing important species of medicinal plants is not only the limited involvement of indigenous knowledge in the conservation of medicinal plants but also weak string of indigenous knowledge between old generation and new generation (Kayombo *et al*., 2013; Kideghesho, 2015) [16, 17].
The importance of ethnomedicine in terms of well being and subsistence of indigenous communities has been widely conceded. However, the links existing among these aspects for indigenous communities have often been ignored by the mainstream literature (Brush, 2007; Hamilton, 2004; Slikkerveer, 2006) [5, 13, 31].

The particulars regarding the medicinal properties of plants felled traditionally generation after generation through medicine man. Now-a-days the ancestral knowledge is in the way of erosion due to deterioration, deforestation, agricultural expansion and demographic pressure. Traditional knowledge of medicinal plants and their use by indigenous cultures are not only useful for upkeep of cultural traditions and biodiversity but also for community healthcare and drug development at present and in the future. Therefore, recording of folk knowledge of medicinal plants is an essential. The objective of this study was to interact with local traditional healers and to document their knowledge on application of medicinal plants, their utilization and the types of infections handled, etc.

Therefore, this paper was set to find out the knowledge space abutting the use of indigenous knowledge on conservation of medicinal plants to secure their imperishable and the factors affecting indigenous knowledge use in sustentation.

Materials and Methods

Pathukani, is a village in Vilavancode taluk, Kanyakumari District, has an altitude from 345.00 m – 1131.89ft, lies within the geographic coordinates of 8° 28' 34.2696" N77° 13' 38.4672" E. Kanyakumari district of Southern Western Ghats is one of the botanically rich areas of Indian peninsula. The distinctiveness of the medicinal flora of this region is largely due to the manifold topography, tropical climate and hefty rainfall. Climate of the village is moderately hot and humid. The temperature varies from 16ºC-35ºC. Pathukani is a remote tiny tribal village without proper roads, bus service. The beneficiary of that village is economically and socially backward people. The members of this community are short, have black skin, and have stick up foreheads. Collecting forest produce is the main means of living for them.

The study was conducted June 2020 to May 2021. Regular field trips to Pathukani were made during the study period. People in this region can easily understand Tamil and can also communicate in that language. Detailed methodology, field survey of folk medicine has been used (Sezik *et al*., 1991) [29]. Plant specimens collected from the field with their local names were identified with the help of regional and local floras. Data was collected from countryside through the use of participatory techniques regarding aches and pains, eye infection, fever, weakness, dog bite, boils and wounds and hair fall. Their former practices regarding the use of medicinal plants were recorded. The information obtain to use of medicinal plants was record for the purpose of the study. The voucher specimens were place in the herbarium of Botany Department, Nesamony Memorial Christian College, Marthandam for future references.

Results

Plants and their parts were found to be used by agricultural household in processed and unrefined form for general health maintenance. The present survey on the indigenous use of medicinal plants by the tribal people of Pathukani Panchayath has documented 50 plant species which are used by the local inhabitants to treat various disorders. They fall into 27 families and 46 genera (Table- 1). Members of the family Solanaceae (5 species) dominated the therapy practices and Apocynaceae, Lamiaceae, and Malvaceae are the Co-dominant families (4 species each), followed by Leguminosae (3 species), Asparagaceae, Compositae, Cucurbitaceae, Euphorbiaceae, Liliaceae, Myrtaceae, Phyllanthaceae and Zingiberaceae (2 species each), 14 families were monospecific (Table-1 &2). Among the growth forms (habit wise), herbs (40%) ranks first in their curative properties among all the others, followed by shrubs (24%), climbers (24%) and the least representation was by trees (12%) only (Fig.1). Different modes of preparation are practiced by the resident of the study area i.e. decoction, juice, powder, paste, infusion, poultice, vapour etc. Most commonly used part is leaf accompany by root/tuber/rhizome. Most frequently treated ailment is rheumatism (Fig. 2). Figure 3 & 4 depicts the most commonly used plant parts and the modes of amalgam of ethno-medicine.

Leaves are the extensively used followed by roots and whole plants. Photosynthetic pigments such as alkaloids and tannins are thought to accumulate active components in leaves. As a result, the leaves are preferred by the majority of traditional healers (Passulacqua *et al*., 2007, Fortini *et al*., 2016) [22, 9]. Figure 1 shows the frequently used life forms in the study area. Despite this, bulbs and tubers, as well as the same plant, were employed in some of the disorders.

This outcome is consistent with the fact that leaves are the most commonly used component (Ezekiel and Daniel, 2012). Leaves are more effective as a remedy for ailments than other parts of the plant (Umair *et al*., 2017) [33]. Some ethno-medical plants found in this study area are also reported such as *Ocimum tenuiflorum, Cannabis sativa, Cardiospermum halicacabum, Lawsonia inermis, Phyllanthus niruri* and *Solanum americanum*. Studies suggest that, documenting the knowledge of ethno-botanical and ethno-medical plants may play pivotal role in maintaining traditional ethno-botanical knowledge. Several researches on medicinal plants used by tribal people in India have discovered that, they prefer traditional medicine since it is low priced, has fewer reactions, and is a part of their life and culture, which is the foundation for our findings. Due to a shortage of medical facilities in India, in remote areas, medicinal plants are the only source of health care (Janjua *et al*., 2021; Nautiyal, 2002; Puri and Kumar, 2019; Puri *et al*., 2019) [14, 21, 25]. Few other researchers discovered comparable results, namely that herb species predominated among the therapeutic plant species identified (Ghani, 2004; Halim *et al*., 2007; Rana *et al*., 2009; Maroyi, 2018) [10, 12, 26, 20]. Herbaceous plants (40%) were dominating life form in this region. These findings are similar to other previous studies, as reported by Yadav *et al*., 2009 [34] and Sanjay *et al*., 2012 [28].

This may be due to their simple nearness in adjacent places, as opposed to other kinds such as trees and bushes, which must be picked from forest parts that are typically placed far from residential sites.

The plants possessing bland and antibacterial properties were found to be used to treat aches and pains. The effect on bacteria lessens infection thus leading to reduction in pain. The anodyne property helps to relieve pain even when not caused by some infection. Kaur (2003) [15] also reported the use of Margosa during pre and post maternal care for reducing swelling and fend off infection. The reported plants were found to have anti-periodic and antiviral properties which were effective in ward off regular occurrence of fever due to viral infections and malaria. The anodyne property being helpful in providing relief from pain proved effective in fever. Being good appetizers the identified plants helped to increase appetite, which usually gets effected due to bad taste of mouth during and after fever. Punia and Chhikara (1999) [24] reported the use of tea prepared by boiling of scared basil and Chebulic myrobalan for the treatment of fever in Haryana hamlet.

The informant's responses specify that there were variations in the unit of measurement, period and time at which medication are taken and lay down by healers for the same kind of health problems. Amare Getahun (1976) [2], Sofowora (1982) [32], and Dawit Abebe (1986) [7] have also discussed uncertainty and standardization as one snag for the conceding of the traditional health care system.

Borthakur 1992 [4] reported the use of thirteen plant species for the treatment of worm epidemic in children and twenty one species during menstruation, pregnancy and child birth. The homestead of plants own medicinal properties both at ménage and mercantilism can help to warrant their availability for indigenous use in health care practices. The findings are similar to Mapara (2009) [19] who explain indigenous knowledge systems as a body of knowledge of particular geographical areas which people have get through on for a time immemorial. The traditional knowledge on conservation was not allocated to education levels held by the community. This might be due to the fact that people's science is not acquired from advanced education setup rather through cultural practices and experiences. This suggests that the knowledge is adopted by means of passing it orally from generation to generation. These findings are in disparity with observation of who found education as an important factor determines indigenous knowledge on conservation. The insinuation of this finding is that, since conventional education may provide people with uncovering and innovations, there is the overtone possibility of mingle the indigenous knowledge with formal training and/or technologies. Therefore, present young generation does not have enough knowledge about indigenous medical plants and their mode of application for different ailments treatment. Thus, it is very pivotal to transfer this valuable ethno-botanical knowledge from the elderly and resourceful persons to the young generation and record it as well, because through proper documentation of this knowledge we will not lose this unlimited natural wealth, which is going to fade quickly. Hence, this study provided valuable information about the ethno-botanical use of medicinal plants (leaves, bark, roots, fruits, seeds, gum, etc.) in selected area. The folk knowledge and skill of traditional medicine practitioners must be motivate and protected. This could be the way through which such people could exercise their recklessly. Uplifting people to grow medicinal plants in the home gardens, mixing with crops in ranch and live fences is uppermost important.

The determination has documented significant indigenous knowledge about local medicinal process
plant a variety of pestilence in this region, which is now ready for further research for biological, pharmacological and toxicological safeguard.

Conclusion

Therefore, these medicinal plants should be engrossed for detail phytochemical and safety assessments. Proper analysis of herbal formulations and phyto-constituents of used plants can open new door for the investigator. However, ethno-botanical data is the basis of further attestation of implementation and plant uses in the factors of a competent to bloom holistic medicine.

Table 1: Survey of identified medicinal plants of the study area.

Sl. No	Botanical Name	Family	Habit	Local Name	Uses
1	*Abutilon indicum* (L.) Sweet	Malvaceae	Shrub	Thuthi	i) Root decoction in taken orally to cure diabetes. ii) Fresh tender leaves eaten raw to cure piles
2	*Acalypha indica* L.	Euphorbiaceae	Herb	Kuppaimaeni	i) Leaf decoction with garlic is taken orally as anthelmintic. ii) Decoction of the inflorescence is taken 2-5 ml daily for two weeks to cure gynecological disorders.
3	*Achyranthes aspera* L.	Amaranthaceae	Herb	Nayuruvi	i) Leaf paste is applied over snake bite for seven days. Whole plant decoction is an antidote.
4	*Aloe vera* (L.) Burm. f.	Liliaceae	Herb	Chottukattazhai	i) Pulp of the leaf is used in piles. ii) Leaf pulp is used pulp is used as hair conditioner
5	*Alpinia galanga*	Zingiberaceae	Herb	Perarathai	i) Rhizome is made into a paste with the bark

	(L.) Willd.				of *Cassia fistula* and is applied on the area affected with rheumatism. ii) Rhizome paste is used to cure convulsions.
6	*Anacardium occidentale* L.	Anacardiaceae	Tree	Kollavumaram	ii) Oil is also applied in rheumatism.
7	*Areca catechu* L.	Arecaceae	Tree	Kamugu	Un-ripened tender fruits are chewed well as a cure to toothache.
8	*Aristolochia indica* L.	Aristolochiaceae	Climber	Easwaramuli	ii) Leaf paste is applied over snake bite for seven days. Whole plant paste is an antidote.
9	*Asparagus racemosus* Willd.	Asparagaceae	Climber	Sathavari	To cure gynecological disorders tuber decoction is taken orally, twice a day for 30 days.
10	*Biophytum sensitivum*(L.) DC.	Oxalidaceae	Herb	Theendanaazhi	ii) Whole plant is made into a paste and is applied on dog bite. ii) Decoction of the whole plant is used to treat diabetes. iii) Entire plant is pounded with equal amounts of *Cocos nucifera* flowers and raw rice. The preparation is given orally to stop bleeding after delivery.
11	*Blepharis integrifolia* (L.f.) E.Mey. & Drège ex Schinz	Acanthaceae	Herb	Athaluporunthi	Paste of the leaf is applied on severe wounds to stop bleeding.
12	*Capsicum annuum* L.	Solanaceae	Herb	Kantharimilagu	i) Leaf decoction is used to cure common cold. ii) Fruits are included in diet to lower blood pressure.
13	*Cardiospermum halicacabum* L.	Sapindaceae	Climber	Uzhingna	i) Powder of shade dried whole plant is eaten every night as a diuretic. ii) Poultice of the whole plant is applied externally in rheumatism. iii) Whole plant decoction is taken as a remedy for chronic cough.
14	*Catharanthus roseus* (L.) G. Don	Apocynaceae	Herb	Poonari	i) Flower decoction is taken internally to reduce blood sugar level. ii) The same also cures cancer if taken once a day for two months.
15	*Centella asiatica* (L.) Urb.	Apiaceae	Herb	Vallarai	i) Leaf decoction with jaggery is taken internally in empty stomach to cure rheumatism. ii) Leaves and cumin seeds are ground well and extracted. Extract is filtered through white cloth. This filtrate is applied to the eyes to cure eye diseases.
16	*Cheilocostus speciosus* (J.Koenig) C.D.Specht	Costaceae	Herb	Kottam	i) Leaf is extracted with hot water and is given as a relief to intestinal worms and stomachaches.
17	*Cissampelos pareira* L.	Menispermaceae	Climber	Malaithangi	i) This plant with *Elephantopus scaber* is pounded, the juice is extracted and it is administered internally as a cure for varmam and to cure body pain. ii) Root decoction is given orally to treat abdominal disorders.
18	*Clitoria ternatea* L.	Leguminosae	Climber	Shangupushpam	Root paste is applied externally to cure headache.
19	*Curculigo orchioides* Gaertn.	Hypoxidaceae	Herb	Nilappanai	i) Powder of the rhizome is given internally as a coolant and refrigerant. ii) Root paste is administered externally is piles. iii) Whole plant is pounded with palm jiggery, raw rice and is given internally as a vitalize for post delivery in women.

20	*Curcuma longa* L.	Zingiberaceae	Herb	Manjal	Paste of the rhizome is applied over scorpion bite. It will remove the thorn of the scorpion from the wound.
21	*Datura metel* L.	Solanaceae	Shrub	Oomathai	Fruit is smoked into the mouth to cure toothache.
22	*Drimia indica* (Roxb.) Jessop	Asparagaceae	Herb	Narivengayam	The bulb is cooked in fire and is placed on wounds caused by stepping on the faeces of dogs.
23	*Eclipta prostrata* (L.) L.	Compositae	Herb	Karisalankanni	i) Whole plant is made into paste with tender coconut is taken orally to treat jaundice and cold. ii)Juice of the plant and coconut oil in the ratio 1:1 is boiled and the oil is used externally in the hair scalp as hair tonic
24	*Elephantopus scaber* L.	Compositae	Herb	Yanaichavuttadi	Powder of the plant along with milk is given internally as a cure to jaundice
25	*Hemidesmus indicus* (L.) R. Br. Ex Schult.	Apocynaceae	Climber	Nannari	Roots are crushed, boiled in coconut oil; oil is cooled and externally applied in rheumatism.
26	*Hibiscus cannabinus* L.	Malvaceae	Shrub	Pulichakkeerai	Juice of the flower with sugar and black pepper is used in flatulence.
27	*Hibiscus rosa-sinensis* L.	Malvaceae	Shrub	Chembaruthi	i) Flower decoction is a cardio tonic. Leaf sherbet is a coolant. ii) Leaves and flowers are boiled in coconut oil. The oil promotes hair growth.
28	*Indigofera tinctoria* L.	Leguminosae	Shrub	Neelavari	Leaf extract is a powerful antidote. Leaf extract with pepper is given internally to cure psoriasis, eczema and skin eruptions.
29	*Lantana camara* L.	Verbenaceae	Shrub	Unnichedi	Flower paste is applied externally on cuts and wounds
30	*Lawsonia inermis* L.	Lythraceae	Shrub	Maruthoni	Paste of the whole plant along with that of *Eclipta alba* is boiled in coconut oil. This oil is a good hair tonic.
31	*Leucas aspera* (Willd.) Link	Lamiaceae	Herb	Venthumbai	Whole plant is made into a paste with palm jiggery and eaten in stomachache
32	*Mimosa pudica* L.	Leguminosae	Climber	Thootalvaadi	Whole plant decoction cures asthma, diarrhea, piles minor wounds and whopping cough
33	*Momordica charantia* L.	Cucurbitaceae	Climber	Pagalkai Chedi	Decoction of immature fruit is taken internally as a remedy for diabetes.
34	*Mukia maderaspatana* (L.) M.Roem.	Cucurbitaceae	Climber	Kasappuchedi	Leaf paste is applied externally on forehead to cure fever
35	*Myrcianthes fragrans* (Sw.) McVaugh	Myrtaceae	Shrub	Kirambu	i) Decoction of flower bud is taken internally as a cure to tuberculosis. ii) Flower buds are chewed between damaged teeth to cure toothache.
36	*Ocimum tenuiflorum* L.	Lamiaceae	Shrub	Tulasi	ii) Leaf paste is applied on spider sting to break poison. ii) Leaf decoction with palm candy and pepper seeds is taken orally as a remedy to cough.
37	*Phyllanthus emblica* L.	Phyllanthaceae	Tree	Nelli	Fruits are eaten for their vitamin C content. Decoction of this plant along with *Desmodium gangeticum*, *Asparagus racemosus* and *Pseudarthria viscida* is taken orally to get postpartum vigour.
38	*Phyllanthus niruri* L.	Phyllanthaceae	Herb	keezhanelli	Whole plant paste with coconut milk is eaten as a remedy to jaundice.
39	*Piper nigrum* L.	Piperaceae	Climber	Nallamilagu	i) Roast the seeds in coconut oil, powder it. Mix this seed powder with honey and given orally in empty stomach to cure rheumatism. Ii)Decoction of the seeds + dried ginger +

					Palm candy is given internally as a remedy to cold and cough
40	*Plectranthus amboinicus* (Lour.) Spreng.	Lamiaceae	Herb	Karpooravalli	i) 4-5 leaves dipped in oil and roasted slightly over flame. The juice is extracted and a teaspoon full is given orally to children as a remedy to cough and flatulence. ii) Leaf extract is taken internally to dissolve bladder and kidney stones.
41	*Psidium guajava* L.	Myrtaceae	Tree	Koyya chedi	i) Decoction of the leaves cure diarrhea and control blood sugar level. ii)Leaf paste is externally applied on the forehead in fever
42	*Ricinus communis* L.	Euphorbiaceae	Tree	Amanakku	Tender leaf and root paste with tender coconut is taken orally in empty stomach as a remedy for jaundice
43	*Sida rhombifolia* L.	Malvaceae	Shrub	Kuruthotti	Root paste is externally applied in piles.
44	*Smilax zeylanica* L.	Liliaceae	Climber	karuvilanchikudam	Root extract is boiled and applied in headache.
45	*Solanum americanum* Mill.	Solanaceae	Herb	Manathakkali	Decoction of the leaf + *Allium cepa* bulb + *Trigonella foenumgraecum* seeds is taken internally to cure ulcers of the mouth and intestine.
46	*Solanum surattense* Burm. f.	Solanaceae	Herb	Kandankathiri	Shade dried fruit powder is mixed with honey and is given orally twice a day as a relief from respiratory disorder, asthma as well as cold.
47	*Solanum torvum* Sw.	Solanaceae	Shrub	Sundaikkai	i) 30gm dried root + 5 gm dried ginger + 1 gm cumin seeds are boiled in 2 lit. of water, reduce it to 500 ml and is given four to five times a day to cure fever.
48	*Tabernaemontana alternifolia* L.	Apocyaceae	Tree	Paalvadi	i) Apply the latex of the plant on the wound caused by thorn prick, the thorn will be ejected out. ii) Vapour of the hand crushed flower is externally given to the ears to cure ear ache.
49	*Tylophora asthmatica* (L. f.) Wight & Arn.	Apocyaceae	Climber	Nancharuppan	Fresh leaf with one pepper seed is eaten daily in empty stomach as a cure to asthma.
50	*Volkameria inermis* L.	Lamiaceae	Shrub	Sangukuppi	i) Leaf juice boiled with castor oil and the coil is applied on eczema. ii)Oil boiled with the root is applied in rheumatic pain

Table 2: Family-wise distribution of Plant species in the study area

Family	Genus	Species
Solanaceae	3	5
Apocyaceae	4	4
Lamiaceae	4	4
Malvaceae	3	4
Leguminosae	3	3
Asparagaceae	2	2
Compositae	2	2
Cucurbitaceae	2	2
Euphorbiaceae	2	2
Liliaceae	2	2
Myrtaceae	2	2
Phyllanthaceae	1	2
Zingiberaceae	2	2
Acanthaceae	1	1
Amaranthaceae	1	1
Anacardiaceae	1	1

Apiaceae	1	1
Arecaceae	1	1
Aristolochiaceae	1	1
Costaceae	1	1
Hypoxidaceae	1	1
Lythraceae	1	1
Menispermaceae	1	1
Oxalidaceae	1	1
Piperaceae	1	1
Sapindaceae	1	1
Verbenaceae	1	1

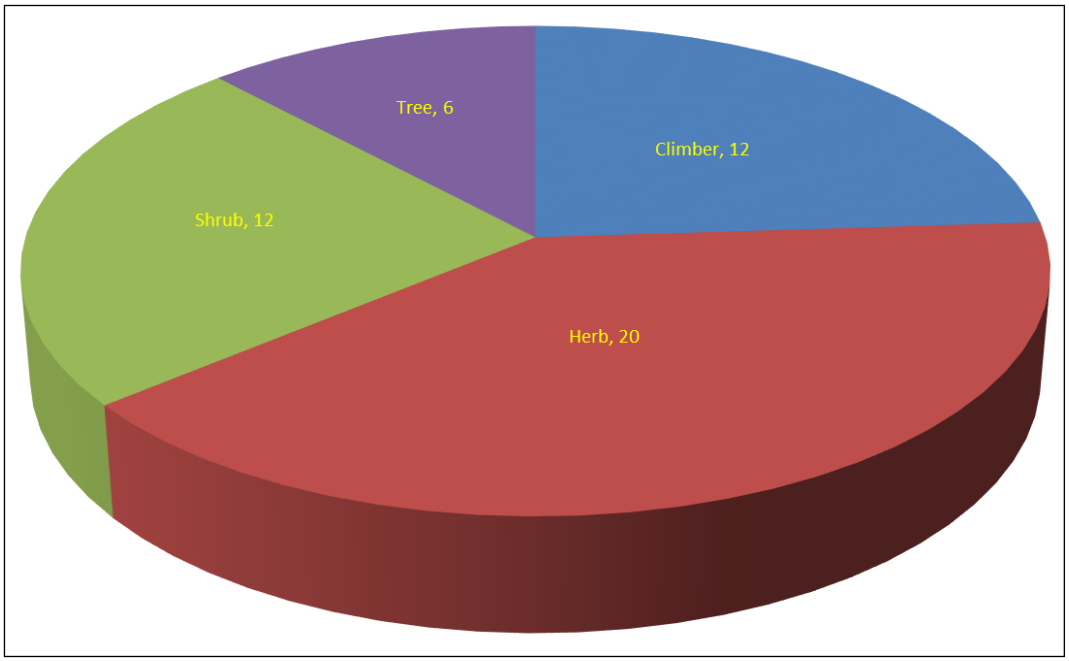

Fig 1: Habit-wise distribution of plant species in the study area

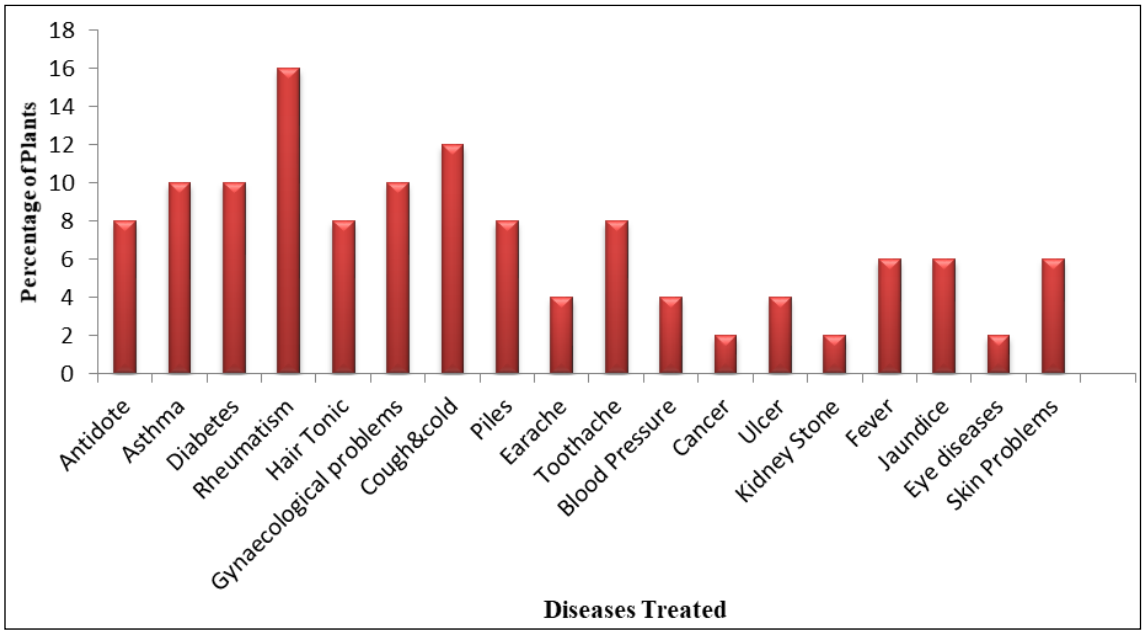

Fig 2: Percentage of Plants used to treat diseases

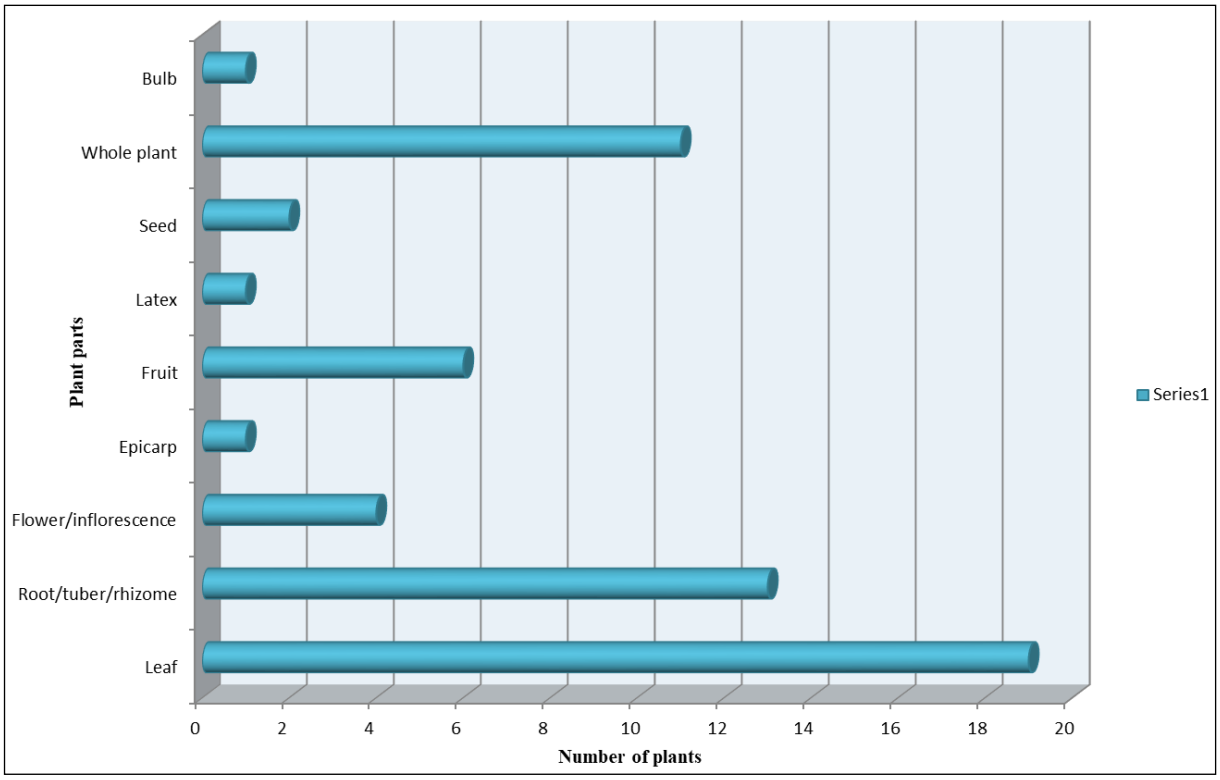

Fig 3: Number of plant parts used

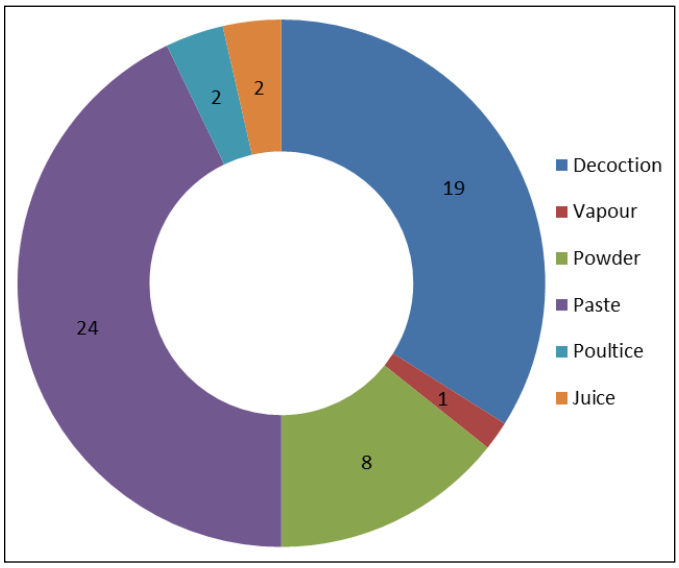

Fig 4: Form of administration

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