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The extant ethnomedicines of six different hills of Eastern Ghats, South India

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ABSTRACT

The extant ethnomedicines of the Eastern Ghats of South India were inventoried. The ethnobotanical survey conducted during the months of June to August 2018 in the six different hills of Eastern Ghats divulged a total of 54 (76%) medicinal plants belonging to 34 families being currently used by the herbal practitioners. The comprehensive details on the vernacular name, binomial, family, and plant part(s) used, and type of drug preparation of the ethnomedicines used for the various disease(s) are tabulated. The plant family Fabaceae (with five ethnomedicines) followed by *Euphorbiaceae* and *Solanaceae* (four each) were the dominant contributor in the Eastern Ghats. Interestingly, the same families were found contributing in similar patterns (nine and four each) in the literature pertaining to the Eastern Ghats, indicating their heritage and significance. Further, the ethnobotanical survey revealed that the leaves (25%) and paste form (46%) are the predominant plant part and drug type used respectively in the hills. The analysis also revealed the prevalent use of a single drug (70%) and their overall depletion (24%) underlining the urgency to conserve them.

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KEYWORDS: Eastern Ghats, Ethnomedicines, Fabaceae, South India

INTRODUCTION

Ethnomedicines are identified by various researchers and are further studied using in silico approaches to combat human diseases including the recent global health crisis instigated by SARS-CoV-2 (Abdelli *et al.*, 2020; Elfiky & Azzam, 2021; Elmezayen *et al.*, 2021; Enayatkhani *et al.*, 2021; Enmozhi *et al.*, 2021, Elfiky & Azzam, 2021; Sarma *et al.*, 2021; Sinha *et al.*, 2021., Alagu Lakshmi *et al.*, 2021; Gupta *et al.*, 2021). About 80 phytochemicals of ethnomedicines are proved to have therapeutic effects on related diseases through *in vivo* and *in vitro* experiments by the mechanism of autophagy (Lai *et al.*, 2022). India being the largest producer of medicinal herbs is appropriately called "The Botanical garden of the World" and ethnomedicines rich in phytochemicals is becoming a medicinal trend for the management of human ailments (Priya & Chittibabu, 2018). Harshberger in 1896 coined the term ethnobotany to indicate the plants used by the aboriginals. It included the study and evaluation of plant-human relations in all phases and the effect of the plant environment on human society. Subsequently, Schulte's (1962) defined ethnobotany as the study of the relationship which exists between people of primitive societies and their plant environment. In many developing countries, ethnomedicinal plants have not been well documented. The majority of knowledge is still held by traditional people, whose wisdom is either lost or passed down orally to the next generation. Further, the diseases of modern society are life style disorders and the use of herbal medicines can overcome such problems. Several studies in India have proved the therapeutic values of ethnomedicines in different aspects of their applications (Aumeerudy, 1996; Choudhary *et al.*, 2008; Sankaranarayanan *et al.*, 2008; Arunachalam, *et al.*, 2009; Balakrishnan, *et al.*, 2009; Chojnacka *et al.*, 2020; Alagesaboopathi, 2011; Beverly & Sudarsanam, 2011; Praveen & Chittibabu, 2013; Samundeeswari *et al.*, 2013; Adhikesavan & Chittibabu, 2013; Borokini, *et al.*, 2013; Selvaraj *et al.*, 2014; Ranjithkumar *et al.*, 2014; Sivasankari, *et al.*, 2014; Manoharan *et al.*, 2015; Kavitha *et al.*, 2015; Ranjithkumar & Chittibabu, 2015; Manoharan & Chittibabu, 2016; Endale *et al.*, 2016). Herbal medicines are also ideal for people's social and cultural demands, and they have an impact on the patient's physical, mental and emotional states. A wide variety of plant species contain biologically active substances, which in synergistic combinations are effective combating various diseases. The laboratory models tests are needed to prove their efficacy and the next step should be to conduct clinical trials on patients and observe

the potential. It is important to note that the advantage of using these preparations is that they are extremely safe for patients and have no known side effects.

The ethnomedicines of Tamil literatures are published by International Institute of Tamil Studies; an organization of Government of Tamil Nadu, India. Hence, the traditional herbals of yesteryears and comparing the traditional knowledge with ethnobotanical field inventories are planned in this study with the objectives of to inventory the extant ethnomedicines of six different hills of Eastern Ghats of India and to analyze the single and compound drugs in usage by the herbal practitioners in the Eastern Ghats of India, to consolidate the pharmacognostic characters of the inventoried herbals and those enshrined in the literature; and finally to create a database on the predominant plant part of the herbals and the drug type used at present for the different human ailments in the study area.

MATERIALS AND METHODS

The data of ethnobotanical field inventories were carried out from June to August 2018 in six different hills, Azhagar hills, Jambuthumalai hills, Jawadhu hills, Kolli hills, Parvathamalai hills and Sirumalai hills of Eastern Ghats of South India were analyzed (Figure 1). The topographical details of six different hills are presented in Table 1. Eastern Ghats of India comprises discontinuous patches spread across Tamil Nadu, Andhra Pradesh, Orissa, and South West Karnataka in south India. With the cooperation of three informants in the hill areas, their traditional knowledge of them has been recorded through videos besides the survey instruments. Voucher specimens of the field study were identified by the flora of Madras Presidency (Gamble, 1956) and the flora of Tamil Nadu Carnatic and deposited in the Department Herbarium, Presidency College (Autonomous), Chennai-600005.

Table 1: The topographical details of six different hills inventoried for the ethnobotanical aspects of Eastern Ghats, south India

S.No.	Hill Name	District in Tamil Nadu, South India	Topography and Altitude
1	Azhagar hills	Madurai	10° 05′ N, 77°30′ E and 1,000 m
2	Jambuthumalai hills	Salem	11° 56′ N, 78° 32′ E and 1,182 m
3	Jawadhu hills	Tiruvannamalai	12° 55′ N, 78° 35′ E and 2,315 m
4	Kolli hills	Nammakkal	11° 16′ N, 78° 22′ E and 1, 000 m
5	Sirumalai hills	Dindigul	10° 19′ N, 77° 99′ E and 1,000 m
6	Parvathamalai hills	Tiruvannamalai	12° 26′ N, 78° 58′ E and 2,315 m

The present study has selected verses (485 – 500 of Chapter 32 – Arunthamizh Maruthuva Arivurai) of the treatise, "Arunthamizh Maruthuvam 500" (2018 reprint) on traditional Siddha medicines. "Arunthamizh Maruthuvam 500" (literally means Significant Tamil Medicine System) consists of 500 versus on folkloric system of Tamil herbal medicine with 33 Chapters (Simhan, 2018). 'Arunthamizh Maruthuva Arivurai' (literally means Significant Tamil Medical Advice) comprises the Chapter 32 with 15 versus from 485 to 500 and deals with ethnomedicines of plant origin, animal derivatives such as honey, peacock (pea bird) feather, butter and curd from cow milk, white yolk of egg, shell of marine mollusk, and inorganic compounds such as borax and dew drops (to cure psoriasis in legs) used to cure human ailments. Tamil herbal medicines mentioned in 'Arunthamizh Maruthuva Arivurai' were analysed in this article thoroughly. They are used for comparison with the extant ethnomedicines of Eastern Ghats of India. The details relating to their medicinal use besides identification of vouchers and corroborating their vernacular names using Siddha Pharmacopoeia (Ayush, 2008) and Siddha Materia Medica Gunapadam Part I (Murugesa Mudhaliar, 2006). Data were analyzed using MS Office. Consequent to the current survey on the ethnomedicines of Indian Eastern Ghats and its comparison with the pertinent literature reveal the great lineage of them with similar usage pattern, which reiterates

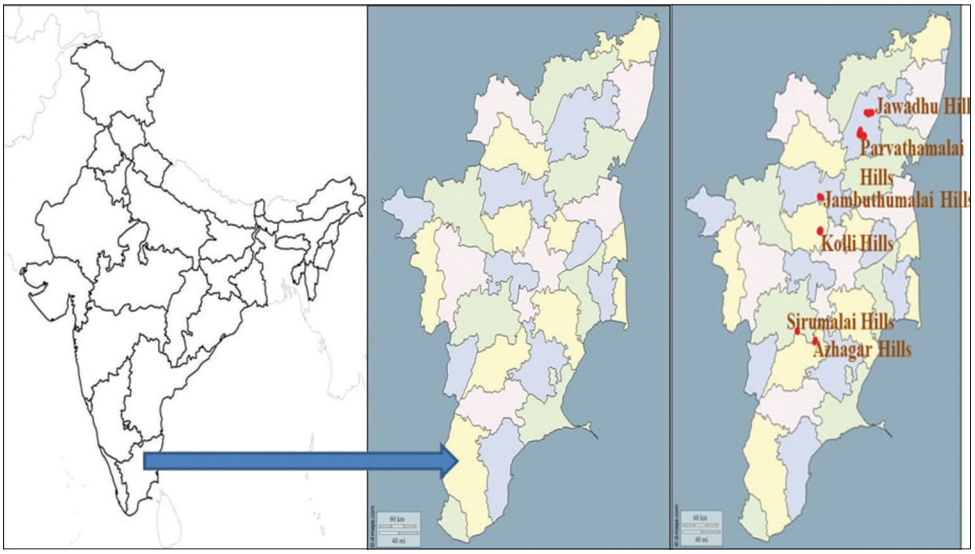

Figure 1: Geographical location of six different hills of Eastern Ghats, South India

Table 2: The pharmaconostic details of ethnomedicines recorded from six different hills of Eastern Ghats of South India

S.no	Location in Eastern Ghats	Tamil Name	Binomial (Family)	Useful part (Preparation type)	Diseases cured/ Organ vitalized
1	Kolli hills	Vallarai	*Centella asiatica* (L.) Urb. (Apiaceae)	Leaves (Paste)	Elixir for brain
2	Jawadhu hills	Nellikkai	*Phyllanthus emblica* L. (Euphorbiaceae)	Fruit (Fruit juice/dry powder)	Nourishes hair growth, rejuvenator
3	Jawadhu hills	Musmuskai	*Mukia maderaspatana* (L.) M.Roem. (Cucurbitaceae)	Leaves (Paste)	Mucolytic, cures cough and cold
4	Kolli hills	Pirandai	*Cissus quadrangularis* L. (Vitaceae)	Stem (Paste)	Cures digestive diseases, increases bone strength, cures joint pain
5	Parvathamalai hills	Vembu	*Azadirachta indica* A.Juss. (Meliaceae)	Leaves, twig, bark and oil from seed	Twig used as tooth brush, bark cures skin diseases
6	Jawadhu hills	Alamaram	*Ficus bengalnesis* L. (Moraceae)	Twig, fruits	Used as tooth brush, fruits dried and mixed with honey to increase sperm count
7	Kolli hills	Inji (Sukku dry form)	*Zingiber officinale* Roscoe. (Zingiberaceae)	Rhizome (Paste)	Appetizer, improves digestion, dry form relieves cough and could
8	Kolli hills	Kezhanelli	*Phyllanthus amarus* Schumach. & Thonn. (Euphorbiaceae)	Leaves (Paste)	Cures Jaundice and hepatitis
9	Jambuthumalai hills	Nandiyavatai	*Ervatamia divaricata* (L.) Burkill. (Apocynaceae)	Flower (decoction)	Cures eye diseases and improves vision
10	Kolli hills	Marul	*Sansevieria roxburghian*a Schult. & Schult.f. (Agavaceae)	Leaves (Paste)	Expectorant, purgative, tonic
11	Kolli hills	Arugampul	*Cynodon dactylon* (L.) Pers. (Poaceae)	Whole plant (decoction)	Skin diseases
12	Jambuthumalai hills	Amugra	*Withania somnifera* (L.) Dunal. (Solanceae)	Rhizome (Paste)	Neural diseases
13	Kolli hills	Nochi	*Vitex negundo* L. (Verbenaceae)	Leaves (steam inhaled)	Running nose, allergic rhinitis
14	Jawadhu hills	Thumbai	*Leucas aspera* (Willd.) Link. (Lamiaceae)	Leaves, flower (Paste)	Cold, cough
15	Kolli hills	Murungai	*Moringa oleifera* Lam. (Moringaceae)	Leaves, flower, fruit, seeds, resin (Paste)	Removes impotency, increases sperm count
16	Jawadhu hills	Santhanam	*Santalum album* L. (Santalaceae)	Oil extracted from wood	Skin diseases
17	Kolli hills	Mudakaruthan	*Cardiospermum halicacabum* L. (Sapindaceae)	Leaves (Paste)	Cures rheumatic Pain
18	Kolli hills	Maruthamaram	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. (Combretaceae)	Bark (Decoction)	Anthelmintic
19	Kolli hills	Poonaikali	*Mucuna pruriens* (L.) DC. (Fabaceae)	Seeds (Powder mixed with cow milk)	Increases sperm count
20	Kolli hills	Panai maram	*Borassus flabellifer* L. (Arecaceae)	Sap from inflorescence and seed pulp	Used to control perspiration in summer, soft drink from sap used as
21	Jawadhu hills	Senthalkodi	*Tinospora cordifolia* (Willd.) Miers. (Menispermaceae)	Stem (Juice extract)	Relieves fatigue
22	Parvathamalai hills	Vendhayam	*Trigonella adscendens* (Nevski) Afan. & Gontsch. (Fabaceae)	Seeds, sprouts and fresh leaves (Paste)	Regulates blood pressure, increases hemoglobin
23	Kolli hills	Milagu	*Piper longum* L. (Piperaceae)	Seeds (Powder mixed with honey)	Cures dry cough, cold and nasal congestion
24	Jawadhu hills	Oridazh thamarai	*Ionidium suffruticosum* Ging. (Violaceae)	Leaves, flower, seeds (Paste)	Increases sperm count
25	Jawadhu hills	Katrazhai	*Aloe vera* (L.) Burm.f. (Liliaceae)	Sap in succulent leaf (Paste)	Regulates menstrual cycle
26	Jawadhu hills	Vasambu	*Acorus calamus* L. (Araceae)	Rhizome fried in flame	Tetanus, digestive disorders and made as paste
27	Parvathamalai hills	Nilavembu	*Andrographis paniculata* (Burm.f.) Nees. (Acanthaceae)	Leaves (decoction)	Dengue fever, increases platelets count in blood
28	Kolli hills	Manathakalli	*Solanum nigrum* L. (Solanaceae)	Leaves, fruits, seeds (cooked as food)	Cures sore throat, ulcer in mouth, liver cirrhosis
29	Kolli hills	Aavarai	*Cassia auriculata* L. (Caesalpinaceae)	Flower, flower bud	Controls hyperglycemia
30	Kolli hills	Kunkiliam	*Boswellia serrata* Roxb. ex Colebr. (Burseraceae)	Resin mixed with butter	Burns and skin itches
31	Kolli hills	Poondu	*Allium sativum* L. (Alliaceae)	Bulb	Ear infection, increases sperm count
32	Kolli hills	Oomathai	*Datura metel* L. (Solanaceae)	Leaves, seeds (dried)	External use for septic condition in ear
33	Jawadhu hills	Kadukai	*Terminalia chebula* Retz. (Combretaceae)	Fruit alone, avoid seed (Powder)	Cures infection in alimentary canal, controls obesity

(Contd...)

Table 2: *(Continued)*

S.no	Location in Eastern Ghats	Tamil Name	Binomial (Family)	Useful part (Preparation type)	Diseases cured/ Organ vitalized
34	Kolli hills	Thandrikai	*Terminalia bellirica* (Gaertn.) Roxb. (Combretaceae)	Fruit alone, avoid seed (Powder)	Cures infection in Alimentary canal, controls obesity
35	Azhagar hills	Avuri	*Indigofera tinctoria* L. (Fabaceae)	Dried leaves (Decoction)	Antidote, anti-bacterial
36	Kolli hills	Etti	*Strychnos nux-vomica* L. (Loganiaceae)	Dried leaves (Decoction)	Antidote, anti-bacterial
37	Jambuthumalai hills	Thuthi	*Abutilon indicum* (L.) Sweet. (Malvaceae)	Leaves (Paste)	Bloody stools, piles
38	Azhagar hills	Impural	*Oldenlandia umbellata* L. (Rubiaceae)	Leaves (Decoction)	Nausea with blood
39	Parvathamalai hills	Athi	*Ficus racemosa* L. (Moraceae)	Dried fruit, bark (Decoction)	Menorrhagia
40	Parvathamalai hills	Naval	*Eugenia jambolana* Lam. (Myrtaceae)	Fruit (Pulp) and Seed (Powder)	Menorrhagia, controls hyperglycemia
41	Jawadhu hills	Mukarattai	*Boerhavia diffusa* L. (Nyctaginaceae)	Leaves (Decoction)	Bloating
42	Jawadhu hills	Elumichai	*Citrus limon* (L.) Osbeck. (Rutaceae)	Fruit juice	Vomiting
43	Kolli hills	Sundaikkai	*Solanum torvum* Sw. (Solanaceae)	Fruit soaked in curd and dried (Powder)	Dysentery
44	Jawadhu hills	Manjal	*Curcuma longa* L. (Zingiberaceae)	Rhizome (Paste)	Chicken pox, small Pox
45	Jambuthumalai hills	Poovarasu	*Thespesia populnea* (L.) Sol. Ex Corrêa. (Malvaceae)	Leaves (Paste)	Leukoderma
46	Kolli hills	Calarchikai	*Caesalpinia bonduc* (L.) Roxb. (Caesalpinaceae)	Seeds (Paste)	Urinary disorders
47	Jawadhu hills	Seemai Agathi	*Cassia angustifolia* M.Vahl. (Fabaceae)	Leaves (Paste)	Burns, wounds in skin
48	Jawadhu hills	Pungan	*Pongamia pinnata* (L.) Pierre. (Fabaceae)	Oil from seeds	Burns, wounds in skin
49	Jambuthumalai hills	Amanaku	*Ricinus communis* L. (Euphorbiaceae)	Oil from seeds	Anti-helminthic
50	Jawadhu hills	Maruthani	*Lawsonia inermis* L. (Lythraceae)	Leaves (Paste)	Fissures in legs
51	Kolli hills	Veppalai	*Wrightia tinctoria* R.Br. (Apocynaceae)	Latex in leaves mixed with coconut oil	Psoriasis, ring worm infection
52	Kolli hills	Thenai maram	*Cocos nucifera* L. (Arecaceae)	Oil from seed pulp	Skin diseases
53	Kolli hills	Kuppaimeni	*Acalypha indica* L. (Euphorbiaceae)	Leaves (Paste)	Skin inflammation, rashes, insect bite
54	Sirumalai hills	Lavangam	*Eugenia caryophyllata* Thunb. (Myrtaceae)	Flower bud (Powder)	Relieves muscle cramp and controls tooth ache

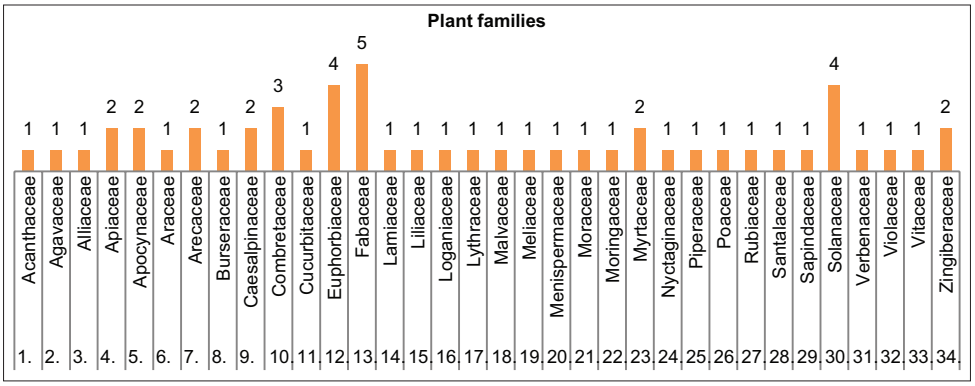

Figure 2: A graphical representation of ethnomedicine contribution by the plant families to the traditional Siddha medicines

the need for the database creation and the conservation strategies for the rare and endangered medicinal plants used by the ethnic people.

RESULTS AND DISCUSSION

A total of 54 medicinal plants belonging to 34 Families were recorded from the survey in the six different hills and found used by the inhabitants to cure or manage several human ailments (Table 2). The analysis of the plant family wise contribution to the ethnomedicines exhibited an interesting finding. A graphical representation (Figure 1) depicts us to understand the ethnomedicines contribution of the plant families to the traditional Siddha medicines. Fabaceae represented by five ethnomedicines is the dominant family followed by Euphorbiaceae and Solanaceae each represented by four each,

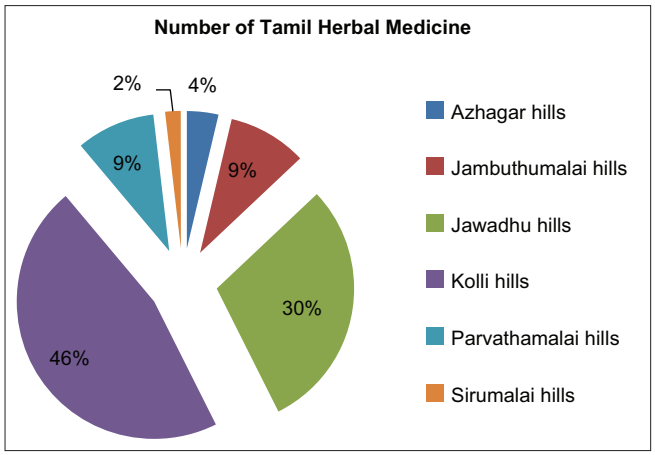

Figure 3: The total number of ethnomedicines found in the Study area

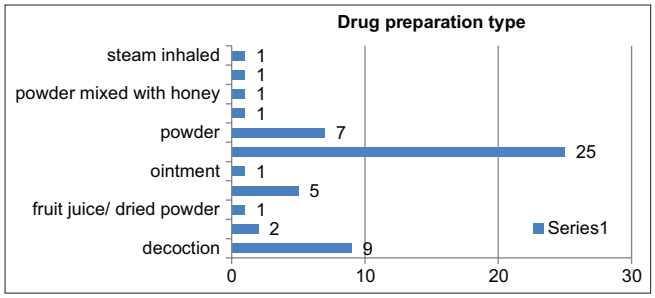

Figure 4: Percentage contributions of plant parts to ethnomedicines found in the study area

Combretaceae by three, Apiaceae, Apocynaceae, Arecaceae, Caesalpinaceae, Myrtaceae and Zingiberaceae by two each, and remaining 24 families represented by one ethnomedicine each (Figure 2).

The analysis based on location exhibited that 25 ethnomedicines were found in Kolli hills, followed by Jawadhu hills 16, Jambuthu hills and Parvathamalai hills five each, Azhagar hills two and finally Sirumalai hills with one ethnomedicine (Figure 3). It is pertinent to mention here that the number count analysis on the survey reflects their similarity with that of the textual record on ethnomedicines found listed in "Arunthamizh Maruthuva Arivurai" of the Siddha treatise on human diseases, "Arunthamizh Maruthuvam 500". The plant species richness and abundance details of ethnomedicines portray the significance of Siddha medicines. Of the different plant parts used as ethnomedicines, eleven are found used as compound drugs and five are used as single drugs with 25% contribution from leaves being used as ethnomedicines (Figure 4). Similarly, the drug preparation types also varied as single and mixed ethnomedicines.

A total of 11 drug types were found used as ethnomedicines (Figure 5). The paste form of the drug was found predominantly used (46%) by the inhabitants of the six different hills surveyed in the Eastern Ghats of South India. The findings are in conformity with the other such studies and stand as a testimony to knowledge of traditional herbal medicine being transferred through generations.

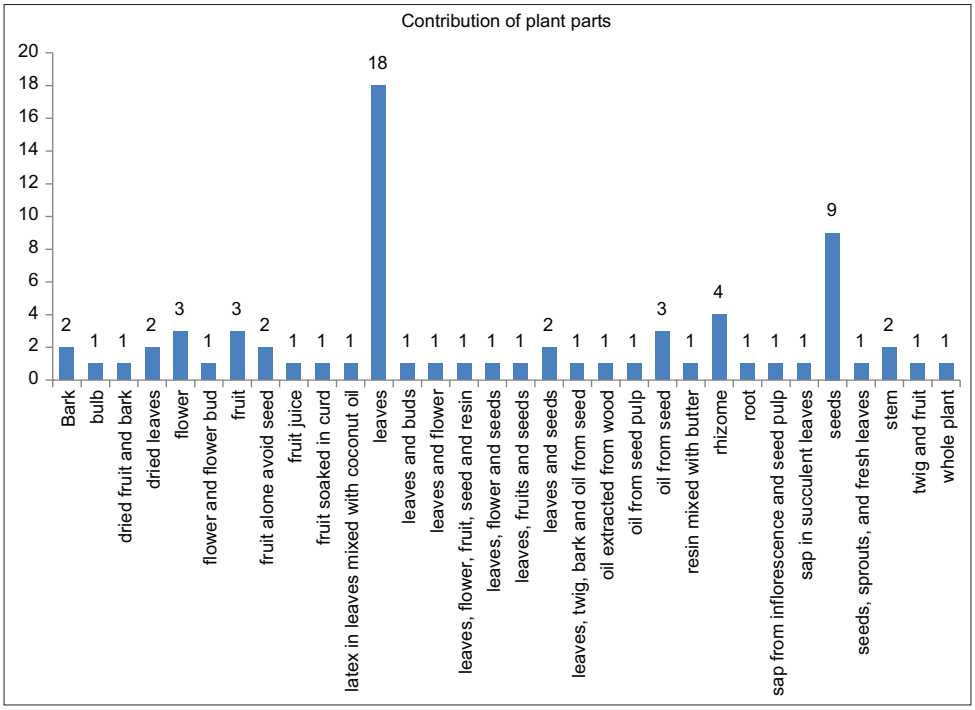

Figure 5: Percentage of drug preparation type as ethnomedicines found in the study area

CONCLUSION

The ethnobotanical survey helped in the revelation that the leaves (25%) and paste form (46%) are the most predominant plant part and drug types used respectively in the hills surveyed. The findings are in conformity with the other such studies and stand as a testimony for knowledge on ethnomedicines being transferred through generations. The occurrence of single ethnomedicine contributing families (70%) and the overall depletion (24%) of the ethnomedicines revealed through the inventories herald the urgency of preservation of traditional knowledge for posterity. Interestingly, the continued domination of ethnomedicine contributing plant families, Fabaceae and Euphorbiaceae in a similar patterns (five and four each) to that of other studies, indicate their significance. As more plant-based drugs have been reported to have autophagy effects on various cells, these effects may lead to new treatment strategies.

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