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Research Article

ETHNOBOTANICAL PLANTS USED FOR POSTNATAL CARE BY TRADITIONAL PRACTITIONERS FROM KOZHIKODE DISTRICT, KERALA, INDIA

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ABSTRACT

An ethnobotanical survey on plants used in postnatal care was conducted in the rural regions of Kozhikode district, Kerala, South India. Oral communication with the local people and interviews with traditional healers and rural birth attendants in this region were adopted to collect information about the plants used for postnatal care. The scientific name, local name, family, plant part used, along with the mode of administration are also documented in this communication.The present study enumerates a list of 153 plant species belonging to 62 families commonly used for postnatal care. The families with the most number of plants used were Poaceae (12) and Fabaceae (12). Majority of documented plants were herbs and shrubs(73%).The most commonly used plant part for preparations were root (20%) and seed (19%). Majority of the herbal formulations are given as decoctions(92%).The use of plant in postpartum period is a common practice in South India. These plant formulations are proved to be effective in rejuvenation after pregnancy. But, a proper scientific documentation is lacking. The number of traditional healers is decreasing steadily due to modernization of medical education system in this region. Therefore, it is imperative to document this knowledge at the earliest. Proper documentation followed by high throughput screening on phytochemicals in these plants will shed light to many potent drugs for treatment of pregnancy associated health problems.

Keywords: Ethnobotanical uses, postnatal care, postpartum period, Kozhikode district.

1. INTRODUCTION

Ethnobotany is the study of plant human relations in all aspects with special reference to the effect of plants on human society. Plants are essential for human survival as it touches all spheres of human life as food, fuel, fodder, cloth, shelter and medicine[1]. According to WHO, 80% of people in developing countries still relies on traditional medicine to meet their primary health needs. WHO states traditional medicine as the total sum of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illness[2].

India is a land of rich biodiversity and plant based medicines are widely used from the time immemorial for treatment of various diseases. This is still a living tradition proved by the existence of rural practitioners of herbal medicine including birth attendance and bone setters as also by the abundance of simple home (grandmother) remedies still used extensively in the countryside[3]. Ayurveda, the ancient Indian system of medicine forms the basis of all these practices. Ayurveda has a well classified *Materia medica*, consisting mainly drugs of plant origin. *CharakaSamhitha* (900 BC) the first written document on Ayurveda describes 341 plants and its therapeutic use and further classified these plants in terms of their physiological activity[4].

The study area Kozhikode district is located in Kerala state of South India(Figure 1). The state mainly harbours wet, semi evergreen,

moist and dry deciduous forests, sholas and grasslands. The district generally has a humid climate with a very hot season extending from March to May. The rainy season is during the South West Monsoon, which sets in the first week of June and extends up to September. The North East Monsoon extends from the second half of October through November. The average annual rainfall is 3266 mm. According to the 2011 census,Kozhikode district has a population of 3,089,543. The district has a population density of 1,318 inhabitants per square kilometer (3,410/sq mi). Kozhikode district has a sex ratio of 1097 females for every 1000 males, and a literacy rate of 95.24%.

The use of traditional medicine is one of the most widespread practices associated with pregnancy, child birth and postnatal care in Kerala. This practice is based on popular previous knowledge transmitted through generations and effectively employed by traditional ayurvedic healers and elderly caretakers for the well-being of both mother and the child[5]. Many ethnobotanical studies associated with pregnancy care were carried out in regard with many rural tribes of Kerala[6,7]. But an extensive study on postnatal care representing large local population is still lacking. Therefore the present study aims at documenting local knowledge and traditional medicine used in postnatal care by the people of rural areas of Kozhikode district.

2. MATERIALS AND METHODS

The study area is located in Kerala state of South India which falls within latitude 11°08' E and 11°50'N and longitude 75°30' E and 76°8' E with the elevation ranging from about 1 m to 700m. Kozhikode is a district of Kerala state, bordered by Kannur district to the north, Wayanadu to the east, Malappuram to the south and Arabian Sea to the west.

This ethnobotanical investigation was carried outfrom December 2014 to May 2015 in the rural areas of the district namelyBalussery to the north, Mavoor to the south, Mukkam to the east and Thali to the west. The people of rural area of Kozhikode widely follow traditional medicines and customs related with their religious believes. Oral communication with the local people and interviews with traditional ayurvedic practitioners in this region were adopted to collect information about the plants used for post pregnancy care. The interviewers include village midwife, nurse, rural birth attendantsand ayurvedic practitioners performing this postnatal care. Photographs of plant or plant part used were taken. Herbal formulations for postnatal care were also noted. Vernacular name mentioned by the local people was clarified with the help of ayurvedic practitioners. The plants used were further authenticated using flora of the region and valid references obtained from ayurvedic practitioners in that region.

3. RESULTS

A total of 153 medicinal plants belonging to 62 families were used for post pregnancy care at different phases (Table 1). All these medicines were taken in post pregnancy days. The treatment procedure using herbal medicines lasts about 90 days with specific herbal formulation in each month. The families with most number of plants used were Poaceae (12) and Fabaceae (12). Majority of the herbal formulations are given as decoctions. The plant parts used in the treatment of post pregnancy care was represented in the Figure 2. The most common plant part used was root (20%) and seed (19%).Majority of plants were herbs.All these herbal formulations were taken along with food restriction. The most commonplants used in herbal formulations practiced in the study area for postnatal care are represented in the figure 3& 4.

4. DISCUSSIONS

To our knowledge, the present study is the first report documenting plants and herbal formulations used in postnatal care in rural areas of Kozhikode district, Kerala, South India. For hundreds of years, traditional ayurvedic healers are the only source of medical care for local population in Kerala. Ayurveda, which means the "science of life" is the oldest medicinal system in Indian subcontinent and has been practiced since 12th century BC. Ayurveda is a way of life rather merely a system of medicine. It aims to accomplish physical, mental, social and spiritual well-being by adopting preventive approaches as well as treating diseases with the holistic approach[8].The dependency on modern medicine for pregnancy is very common in the study area. But plant based traditional medicines are widely used as a common cultural practice in the postpartum period for the wellbeing of mother and the child. The efficacy of these treatments are not scientifically validated but found to be effective in the recovery of mother after pregnancy.Only few studies were carried out to document mother care plants in Kerala and majority of which are focused on specific tribal groups.

Birth is a natural process that involves great physical and emotional strain but generally proceeds without much complication. But most of the world cultures consider postpartum period of transition as a critical period of vulnerability where traditional treatments with

extreme care is provided to both mother and child to avoid unwanted consequences. More than one half of maternal deaths occur during this period. In developing countries, the most common cause of maternal mortality and morbidity is postpartum haemorrhage. It accounts for 25% of maternal death worldwide[9,10]. Other health problems of postnatal period are abdominal pain, infections, prolapse, fatigue, depression, nausea and lactation complications[11,12].

In the present study, the period of administration of these herbal formulations was 90 days post pregnancy. The number of days differs slightly in different regions. Immediately after delivery, a decoction made of *Trachyspermumammi* (L.)Sprague. and*Anethumgraveolens*L. in boiled water was given. *Anethumgraveolens*L. seed extract decreases postpartum hemorrhage due to its contractive characteristic compared to oxytocin[13]. Along with this, juice of *Ichnocarpusfrutescens* (L.) R. Br., *Commiphoracuadata* (Waight&Arn.)Engl., and *Clerodendruminfortunatum* L. was also given.*Clerodendrum* spp. are widely used in traditional medicine for stopping postpartum haemorrhage[14]. But the alleged effect was not scientifically proven.

The use of traditional medicine is very common in Southern Kerala and 52 plant species are reported to be used in post natal pregnancy care. After pregnancy, in order to rejuvenate the body of mother, a medicated water is used called *Vethuvellam*. The mode of preparation and constituent plant species in vethuvellam slightly differ in different places[15]. *Bakera*, a medicated steam bath was used traditionally in Indonesia for recuperation after childbirth[16]. Medicated water bath was used for the entire period. Direct skin contact of essential oil and other volatile substances of the plant improve postpartum health. The predominant family of plants used in medicated bath was Zingiberaceae. Members of family Zingiberaceae, *Zingiberofficinale*Rosc.,Alpinia spp., *Elettariacardamomum* (L.)Maton, all contain 1,8-cineol, which is antimicrobial, anti-inflammatory and analgesic activity. The beneficial effects of these plants in improving postpartum health can be attributed to the presence of 1,8-cineol[17].

Literature regarding the biological activity of only few plants in the list is available. *Curcuma longa* L. was one of the widely used plants in many formulations of postnatal care. *Curcuma longa* L. is made into paste and applied to body before medicated steam bath. *Curcuma longa* L.,dried rhizome powder and cotton cloth ash is mixed with coconut oil used as an antiseptic on the wound of umbilical code[18]. The active principle in *Curcuma longa* L. is curcumin and has myriad biological activities like wound healing, antioxidant,anti-inflammatory, anti-psoriatic and anti-fungalactivities[19,20,21]. Curcumin has not exhibited any toxicity in human trials also suggesting Curcuma as one of the safest plant used in traditional medicine[22].

Daturametel L. and *Azadirachtaindica*A.Juss.made into tablets was used to relive pain. Juice of *Morindaumbellate* L. called as 'kudalchurukki' is given along with coconut milk and sugar.Morinda is given for contraction of uterus after pregnancy. Up to 7 days, Nadikashayam, a decoction made up of many plant extracts was given to treat injury to vital points and also for bone fracture. This is followed by 'mukkidikashayam' and 'Jathimarunnu' for 14 days. *Ziziphusjujube* Mill. used in this formulation is widely used to alleviate postpartum abdominal pain. The analgesic property is by the inhibition of COX-2[23].*Mussaendafrondosa* L.is used as a lactagoge, but antibacterial and immune-stimulating effects was also reported[24]. Juice of *Leucasaspera* (Willd.)Spreng.was also given during this period. This is believed to hasten menstruation. 'Ari idikkunnamarunnu' is special herbal preparation given up to 28 days of post pregnancy. 'Melmarunnu' is given till 90 days. Powder of *Cuminumcyminum* L., *Sesamumindicum* L. and inflorescence of coconut was made into a poultice and given up to 90 days. The plants used in this formulation are reported as highly nutritious [25].

Many parallel studies were conducted to find out the efficacy of traditional medicine compared to drugs used in Western medicine. Paracetamol and NSAIDs (non-steroid anti-inflammatory drugs) are analgesics prescribed to alleviate pain.Many reports suggest that plant extract used in traditional medicine for reducing pain like *Psychotria*(Rubiaceae), *Solanummelongena* exhibited much more analgesic activity compared to conventional drugs[26,27].But in traditional medicine, many plants are used in a single formulation for a general condition. Therefore exact biological effects of the plants in these formulations are not known. The alleged benefit after this treatment may primarily due to the synergistic effect of phytochemicals in these formulations. Very few scientific studies are conducted on these plants especially associated with pregnancy care.

5. CONCLUSION

In the present study, 153 plants belonging to 62 families are documented as plants used in

postnatal care in rural regions of Kozhikode. This data was primarily collected from traditional Ayurvedic practitioners and rural birth attendants. There is a decline in number of traditional Ayurveda practitioners and rural birth attendants, who are not institutionally trained, but have gained knowledge from their family traditions. The knowledge possessed by such traditional healers should be documented, as many approaches are adopted after rigorous experimentation spanning many generations. Majority of studies regarding the efficacy of these traditional medicines suggest the importance of such plants as potential source of drugs for treatment of various ailments. But safety and dosage of plant extracts to be used is still a concern. Scientific documentation followed by phytochemical, pharmacological and clinical studies will definitely yield potential drug candidates that can be incorporated in Ayurveda or any other organized systems of medicine.

Conflict of interest statement:
We declare that we have no conflict of interest.

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Table1: List of plants used for postnatal care in rural regions of Kozhikode District, Kerala, India

LIST OF PLANTS USED FOR POST NATAL CARE						
Sl No.	**Botanical Name**	**Local Name (Malayalam)**	**FAMILY**	**Useful Part**	**Direction**	**Application***
1	*Acacia catechu* (L.f.)Willd.	Karingali	MIMOSACEAE	Wood	Decoction	I
2	*Aconitum heterophyllum* Wall.	Athividayam	RANUNCULACEAE	Rhizome	Decoction	I
3	*Acorus calamus* L.	Vayambu	ACORACEAE	Rhizome	Decoction	I
4	*Actiniopteris dichotoma* Bedd.	Nanmukhappullu	POLYPODIACEAE	Whole plant	Decoction	I
5	*Aegle marmelos* (L.)Correa	Koovalam	RUTACEAE	Root	Decoction	I
6	*Aerva lanata* (L.)Juss.	Cheroola	AMARANTHACEAE	Whole plant	Decoction	I
7	*Allium cepa* L.	Ulli	LILIACEAE	Bulbs	Decoction	I
8	*Allium cepa* var.aggregatum G.Don.	Cheriyulli	LILIACEAE	Tuber	Decoction	I
9	*Allium sativum* L.	Veluthulli	LILIACEAE	Tuber	Decoction	I
10	*Alpinia calcarata* Rosc.	Chittaratha	ZINGIBERACEAE	Stem	Decoction	I
11	*Alpinia galanga* (L.)SW.	Arattha	ZINGIBERACEAE	Rhizome	Decoction	I
12	*Anacardium occidentale* L.	Kasuvandi, Parankimanga	ANCARDIACEAE	Nut	Decoction	I
13	*Anacyclus pyretheum* DC.	Akkil karuka	ASTERACEAE	Stem	Decoction	I
14	*Andrographis paniculata* (Burm.f.) Wall. Nees	Kiriyath	ACANTHACEAE	Whole plant	Decoction	I
15	*Anethum graveolens* L.	Sathakuppa, Chathukkuppa	APIACEAE	Seed	Decoction	I
16	*Aphanamixis polystachya* (Wall.) Parker	Chemmaram	MELIACEAE	Wood	Decoction	I
17	*Aquilaria agallocha*Roxb.	Akil	MELIACEAE	Wood	Decoction	I
18	*Arachis hypogea* L.	Kadala	FABACEAE	Seed	Decoction/ Powder	I
19	*Artemisia maritime* L.	Makkipoovu	ASTERACEAE	Flower	Decoction	I
20	*Arundo donax* L.	Ama	POACEAE	Stem	Decoction	I
21	*Asparagus racemosus* Willd.	Sathavarikkizhangu	ASPARAGACEAE	Tuber	Decoction	I
22	*Azadirachta indica* A.Juss.	Aryaveppu	MELIACEAE	Leaf, Seed	Decoction	I
23	*Bacopa monnieri (L.) Pennell*	Brahmi	PLANTAGINACEAE	Whole plant	Decoction	I
24	*Balanophora fungosa* J.R&G.Forst.	Atthithippali	BALANOPHORACEAE	Seed	Decoction	I

25	*Boerhaavia diffusa* L.	Thazhuthama, Thamizhama	NYCTAGINACEAE	Whole plant	Decoction	I
26	*Brassica nigra* L.	Kaduku	BRASSICACEAE	Seed	Decoction	I
27	*Bswellia serrate* Triana&Planch. Product: Olibanum indicum	Manikkunthirikkam	BURSERACEAE	Gum	Decoction	I/ E
28	*Caesalpinia Crista* L.	Kazhanjikkuru	FABACEAE	Seed	Decoction	I
29	*Caesalpinia sappan* L.	Pathimugam	CAESALPINIACEAE	Wood	Decoction	I
30	*Calophyllum* calaba L.	Cherupunnari	CLUSIACEAE	Seed	Powder	I
31	*Carum carvi* L	Saajeerakam	APIACEAE	Seed	Decoction	I
32	*Cedrus deodara* (Roxb.)G.Don.	Dhevadaram	PINACEAE	Wood	Decoction	I
33	*Centrosema pubescence* Benth.	Kattupayar	FABACEAE	Root	Decoction	I
34	*Cinnamomum malabatrum* (Burm. f.) Bl.	Elavangam	LAURACEAE	Leaves	Decoction	I
35	*Cinnamomum tamala* (Buch.Ham.)Nees.	Pachila	LAURACEAE	Leaf	Decoction	I
36	*Clerodendrum infortunatum* L.	Vattapperu	VERBENACEAE	Leaf	Decoction	I
37	*Cocos nucifera* L.	Thengu	ARECACEAE	Fruit	Decoction/Oil	I/ E
38	*Commiphora myrrha*(Nees) Engl.	Narumpasha	BURSERACEAE	Gum	Decoction	I
39	*Commiphora cuadata* (Waight&Arn.)Engl.	Idinjil	BURSERACEAE	Bark	Decoction	I
40	*Coriandrum sativum* L.	Kotthampalari	APIACEAE	Seed	Decoction/ Powder	I
41	*Coscinium fenestratum* (Gaertn.) Colebr.	Maramanjal	MENISPERMACEAE	Bark	Decoction	I
42	*Cuminum cyminum* L.	Nallajeerkam, Cheriyajeerakam	APIACEAE	Fruit	Decoction	I
43	*Curculigo orchioides* Gaern.	Nilampana	HYPOXIDACEAE	Tuber	Decoction	I
44	*Curcuma longa* L.	Varattumanjal	ZINGIBERACEAE	Rhizome	Decoction/Paste	I/ E
45	*Cyclea peltata*.(Lam). Hook.f & Thomson	Padakkizhangu	MENISPERMACEAE	Root	Decoction	I
46	*Cyperus rotundus* L.	Muthanga	CYPERACEAE	Tubers	Decoction	I
47	*Datura metel* L.	Ummam	SOLANACEAE	Leaf	Juice/Extract	I
48	*Desmodium gangeticum* (L.)DC	Orila	FABACEAE	Root	Decoction	I
49	*Elettaria cardamomum* (L.)Maton	Elam	ZINGIBERACEAE	Seed	Decoction	I
50	*Eleusine coracana* Gaertn.	Muthari	POACEAE	Seed	Decoction/Powder	I
51	*Embelia ribes* Burm.f.	Vizhalari	MYRSINACEAE	Seed	Powder	I
52	*Eragrostis cynosuroides* (Retz.) P.Beauv.	Aattudarbha	POACEAE	Root	Decoction	I
53	*Ferula asafoetida* L.	Kaayam	APIACEAE	Gum	Decoction	I
54	*Ficus benghalensis* L.	Peraal	MORACEAE	Bark	Juice/Extract	E
55	*Ficus racemosa* L.	Atthi	MORACEAE	Bark	Juice/extract	E
56	*Ficus religiosa* L.	Arayaal	MORACEAE	Bark	Juice/Extract	E
57	*Ficus tinctoria ssp parasitica* (Willd.)Corner.	Itthi	MORACEAE	Bark	Juice/Extract	E
58	*Foeniculum vulgare* Mill.	Perum jeerakam	APIACEAE	Fruit	Decoction	I
59	*Fritillaria roylei* Hook.f	Kakoli	LILIACEAE	Bulbs	Decoction	I
60	*Fumaria indica* (Hausskn.)Pugsley	Parppadakam	FUMARIACEAE	Whole plant	Decoction	I
61	*Glycyrrhiza glabra* L.	Eratti maduram	FABACEAE	Stem	Decoction	I
62	*Gmelina arborea* Roxb.	Kumbil, Kumizhu	VERBENACEAE	Root	Decoction	I
63	*Gossypium hirsutum* L.	Paruthikkuru	MALVACEAE	Seed	Decoction	I
64	*Habanaria edgeworthii* Hook.f.ex.Collett.	Rddi	ORCHIDACEAE	Tuber	Decoction	I
65	*Habanaria intermedia* D.Don.	Vriddi	ORCHIDACEAE	Tuber	Decoction	I

66	*Helicteres isora* L.	Idampiri valampiri	STERCULIACEAE	Fruit, Leaf	Decoction	I
67	*Hemidesmus indicus* (L.)R.Br	Nannari	ASCLEPIADACEAE	Root	Decoction	I
68	*Heracleum rigens* Waliichis.	Chittolam	APIACEAE	Fruit	Decoction	I
69	*Hibiscus rosa-sinensis* L.	Chemparathi	MALVACEAE	Leaf, Flower	Juice/Extract	E
70	*Holarrhena pubescens* (Buch-Ham.) Wall.	Kudakapaala, Kudakappalari	APOCYNACEAE	Seed	Powder	I
71	*Holostemma adakodien* Schult.	Adapathiyan	ASCLEPIADACEAE	Tuber	Decoction	I
72	*Hordeum vulgare* L.	Yavam	POACEAE	seed	Decoction	I
73	*Ichnocarpus frutescens* (L.) R. Br	Paravalli	APOCYNACEAE	Whole plant	Decoction	I
74	*Illicium verum* Hook.f.	Thakkolam	SCHISANDRACEAE	Fruit, Seed	Decoction	I
75	*Ipomoea mauritiana* Jacq.	Paalmuthuku	CONVOLVULACEAE	Rhizome	Decoction	I
76	*Justicia adhatoda* L.	Aadalodakam	ACANTHACEAE	Leaf	Decoction	I
77	*Kaemfera galangal* L.	Kachooram, Kacholam	ZINGIBERACEAE	Rhizome	Decoction	I
78	*Lepidium sativum* L.	Ajaali, Aasaali	BRASSICACEAE	Root, Leaf, seed	Decoction	I
79	*Leucas aspera* (Willd.)Spreng.	Thumba	LAMIACEAE	Whole plant	Juice/Extract	I
80	*Lilium polyphyllum* D.Don.	Ksheera kakoli	LILIACEAE	Bulbs	Decoction	I
81	*Maranta arundinacea* L.	Koova	MARANTACEAE	Rhizome	Powder	I
82	*Merremia turpethum* (L.)Silva Manso.	Trikolppakonna	CONVOLVULACEAE	Root	Decoction	I
83	*Mesua ferrea* L.	Nagappovu	CLUSIACEAE	Flower	Decoction	I
84	*Metroxylon sagu* Rottb.	Saboonari, Chowvari	ARECACEAE	Pith of Stem	Decoction	I
85	*Morinda umbellata* L.	Kudal churukki	RUBIACEAE	Leaf	Juice	I
86	*Mucrotyloma uniflorum* (Lam.)Verdc.	Muthira	FABACEAE	Seed	Decoction	I
87	*Mussaenda frondosa* L.	Vellila	RUBIACEAE	Leaf	Juice/Extract	E
88	*Myristica fragrans* Houtt.	Jathikka, Jaathi	MYRISTICACEAE	Seed	Decoction	I
89	*Nardostachys jatamansi* (D.Don)DC.	Jadamanji	CAPRIFOLIACEAE	Stem	Decoction	I
90	*Nigella sativa* L.	Karimjeerakam	RANUNCULACEAE	Fruit	Decoction	I
91	*Oroxylum indicum* (L.) Benth.	Payyazhantha, Palakapayyani	BIGNONIACEAE	Root	Decoction	I
92	*Oryza sativa* L.	Navara nellu	POACEAE	Seed	Decoction/ Powder	I
93	*Panicum sumatrense* Roth.ex.Roem.et.Schull.	Chama	POACEAE	Seed	Decoction/ Powder	I
94	*Papaver somniferum* L.	Vella Kaskas	PAPAVERACEAE	Seed	Decoction	I
95	*Pentunema indicum* (L.)Ling.	Pushkaramoolam	ASTERACEAE	Root	Decoction	I
96	*Phoenix dactylifera* L.	Unakka karaka, Date palm	ARECACEAE	Fruit	Decoction	I
97	*Phyllanthus emblica* L.	Nelli	EUPHORBIACEAE	Fruit	Decoction	I
98	*Pinus roxburgii* Sarg.	Charalam	PINACEAE	Wood	Decoction	I
99	*Piper cubeba* L.f.	Val mulaku	PIPERACEAE	Fruit	Decoction	I
100	*Piper longum* L.	Thippalli	PIPERACEAE	Fruit	Decoction	I
101	*Piper nigrum* L.	Kurumulaku	PIPERACEAE	Fruit	Decoction	I
102	*Piper trioicum* Roxb.	Kattumulaku	PIPERACEAE	Root	Decoction	I
103	*Pistacia integrrima* J.L Stewart ex.Brandis	Karkadakshringi	ANACARDIACEAE	Fruit	Decoction	I
104	*Plectranthus zeylanicus* Benth.	Iruveli	LAMIACEAE	Leaf	Decoction	I
105	*Polygonatum cirrhifolium* (Wall.) Royle	Medha	ASPARAGACEAE	Root	Decoction	I

106	*Polygonatum verticillatum* (L.) All.	Mahamedha	ASPARAGACEAE	Root	Decoction	I
107	*Premna serratifolia* L.	Munja	VERBENACEAE	Root	Decoction	I
108	*Prunus duleis* (Mill.) D.A.Webb.	Badham	ROSACEAE	Nut	Decoction/Powder	I
109	*Pseudarthria viscida* (L.) W&A.	Moovila	FABACEAE	Root	Decoction	I
110	*Psoralea corylifolia* L.	Karkolari	FABACEAE	Seed	Powder	I
111	*Punica granatum* L.	Urumanpazham	LYTHRACEAE	Friut Bark	Decoction	I
112	*Ricinus communis* L.	Aavanakku	EUPHORBIACEAE	Seed, Root	Decoction	I
113	*Rubia cordifolia* L.	Manchatti	RUBIACEAE	Stem	Decoction	I
114	*Saccharum officinarum* L.	Sharkara, Karimbu	POACEAE	Stem	Decoction	I
115	*Saccharum spontanium* L.	Kusha	POACEAE	Root	Decoction	I
116	*Santalum album* L.	Candanam	SANTALACEAE	Wood	Decoction	I
117	*Saussurea lappa* C.B.Clarke.	Vellakottam	ASTERACEAE	Root	Decoction	I
118	*Seidenfia rheedei* (SW.)Szlach.	Jeevakam	ORCHIDACEAE	Tuber	Decoction	I
119	*Senna sophera* (L.) Roxb.	Ponnaveeram	CAESALPINIACEAE	Leaf	Decoction	I
120	*Sesamum indicum* L.	Ellu	PEDALIACEAE	Seed	Decoction/ Powder	I
121	*Setaria italica* (L.)Beauv.	Thina	POACEAE	Seed	Decoction/ Powder	I
122	*Sida rhombofolia* L.	Kurunthotti	MALVACEAE	Root	Decoction	I
123	*Solanum melognena* L.	Cheruvazhuthana	SOLANACEAE	Root	Decoction	I
124	*Solanum violaceum* Ortega	Putharichunda	SOLANACEAE	Root	Decoction	I
125	*Spermacoce hispida* L.	Tharthavval	RUBIACEAE	Whole plant	Decoction	I
126	*Sphaeranthus indicus* L.	Adakkamaniyan	ASTERACEAE	Root	Decoction	I
127	*Stereospermum chelonoides* (L.f)DC.	Paathiri	BIGNONIACEAE	Root	Decoction	I
128	*Streblus asper* Lour.	Paruva, Pasuva	MORACEAE	Flower	Decoction	I
129	*Strobilanthes ciliatus* Nees.	Karinkurinji	ACANTHACEAE	Root	Decoction	I
130	*Strychnos potatorum* L.f.	Thettamparal	LOGANIACEAE	Root	Decoction	I
131	*Symplocos cochinchinensis* (lour.)Moore ssp.Luarina Nooteb.	Pachotti	SYMPLOCACEAE	Bark	Decoction	I
132	*Syzigium aromaticum* (L.)Merrill&Perry.	Karayampoovu	MYRTACEAE	Fl.Bud	Decoction	I
133	*Syzygium cumini* (L.)Skeels.	Njavalpoovu	MYRTACEAE	Flower	Decoction	I
134	*Terminalia bellirica* (Gaertn.) Roxb.	Thanni	COMBRETACEAE	Fruit	Decoction	I
135	*Terminalia chebula* Retz.	Kadukka	COMBRETACEAE	Fruit	Decoction	I
136	*Themeda triandra* Forssk.	Chonakappullu	POACEAE	Whole plant	Decoction	I
137	*Thespesia populnea (L.) Sol. ex Corrêa*	Poovarashu	MALVACEAE	Whole plant	Decoction	I
138	*Tinospora cordifolia* (Willd)Hook.f.&Thoms.	Chittamruthu	MENISPERMACEAE	Whole plant	Decoction	I
139	*Trachyspermum ammi* (L.)Sprague.	Ayamam, Ayamodhakam	APIACEAE	Seed	Decoction	I
140	*Tragia involucrata* L.	Kodithuvva	EUPHORBIACEAE	Root	Decoction	I
141	*Tribulus terrestris* L.	Njerinjil	ZYGOPHYLLACEAE	Root	Decoction	I
142	*Trigonella foenium* L.	uluva	FABACEAE	Seed	Decoction/ Paste	I
143	*Triticum aestivum* L.	Gothambu	POACEAE	Seed	Decoction	I
144	*Valeriana wallichii* DC.	Thakaram	VALERIANACEAE	Rhizome	Decoction	I
145	*Vetiveria zizanoides* (L.)Nash.	Ramacham	POACEAE	Root	Decoction	I
146	*Vigna mungo* (L.)Hepper	Uzhunnu	FABACEAE	Seed	Decoction	I

147	*Vigna radiata* (L.) Wilezek.	Cherupayar	FABACEAE	Seed	Decoction	I
148	*Vigna radiata*var.sublobata(Roxb.) Verd.	Kattuzhunnu	FABACEAE	Root	Decoction	I
149	*Vitis vinifera* L.	Munthiri	VITACEAE	Fruit	Decoction	I
150	*Withania somnifera* (L.) Dunal	Amukkuram	SOLANACEAE	Stem	Decoction	I
151	*Woodfordia fruticosa* Kurz.	Thathiripoovu	LYTHRACEAE	Flower	Decoction	I
152	*Zingiber officinale* Rosc.	Inji	ZINGIBERACEAE	Rhizome	Decoction	I
153	*Ziziphus jujube* Mill.	Lanthakkuru, Badaram	RHAMNACEAE	Seed	Decoction	I

*I= internal, E= external

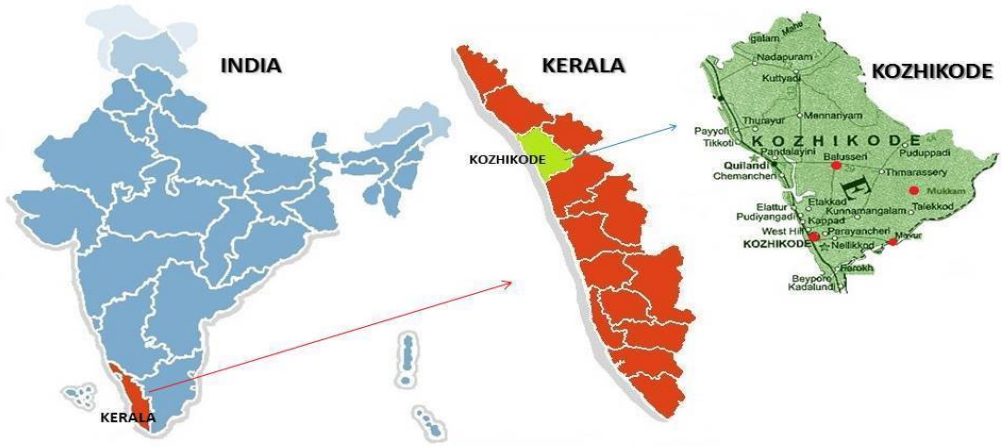

Fig. 1: Map of the study area

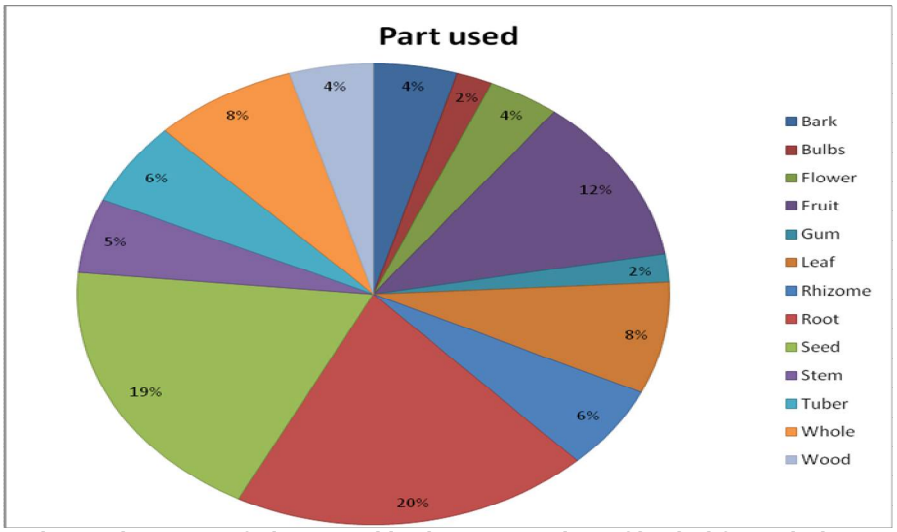

Fig. 2: The parts of plant used in the preparation of herbal formulations

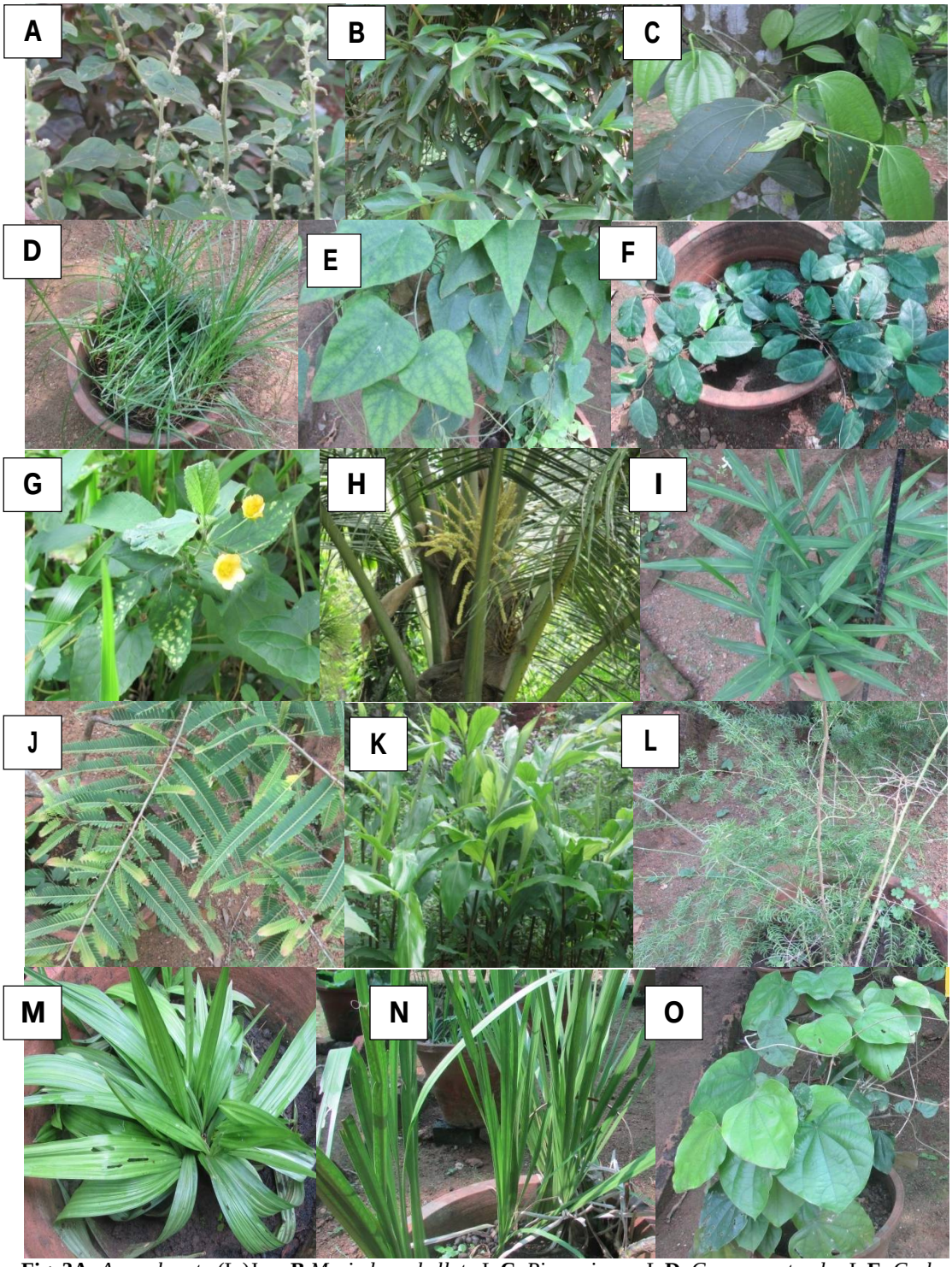

Fig. 3A: *Aerva lanata* (L.)Juss.**B.***Morinda umbellata* L.**C**. *Piper nigrum* L.**D**. *Cyperus rotundus* L.**E**. *Cyclea peltata*.(Lam).Hook.f & Thomson **F**. *Ichnocarpus frutescens* (L.) R. Br **G**. *Sida rhombofolia* L. **H**. *Cocos nucifera* L.**I.***Zingiber officinale* Rosc.**J**. *Phyllanthus emblica* L.**K**. *Maranta arundinacea* L.**L.***Asparagus racemosus* Willd.**M**.*Curculigo orchioides* Gaern.**N**. *Acorus calamus* L.**O.***Coscinium fenestratum* (Gaertn.) Colebr.

Fig. 4: A.*Anethum graveolens* L. **B.***Aphanamixis polystachya* (Wall.) Parker**C.***Saccharum spontanium* L.**D.***Pinus roxburgii* Sarg.**E.***Glycyrrhiza glabra* L.**F.** *Ipomoea mauritiana* Jacq.**G.***Mesua ferrea* L.**H.***Pistacia integrrima* J.L Stewart ex.Brandis **I..***Rubia cordifolia* L.**J.***Psoralea corylifolia* L.**K.** *Embelia ribes Burm*.f.**L.***Holarrhena pubescens* (Buch-Ham.) Wall.**M.***Calophyllum calaba* L**. N.***Nardostachys jatamansi* (D.Don)DC**.O.***Streblusasper* Lour.

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