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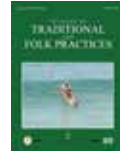
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Herbal remedies for jaundice in tribal system of medicine from Visakhapatnam district, Andhra Pradesh

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Abstract

The present investigation deals with 66 plant species belonging to 61 genera and 40 families used to treat jaundice by the tribal people of Visakhapatnam district, Andhra Pradesh. Euphorbiaceae is the dominant family with 5 species followed by Asclepiadaceae (4 spp.) and others. Herbs are dominant with 31 species followed by trees (18) and others. Leaf is used in 27 practices followed by root (23), whole plant (10) and others. 46 practices were found to be new.

Keywords: Visakhapatnam, Ethnomedicine, *Bagata*, *Khond*

1. Introduction

Jaundice is a symptom rather than a disease and characterized by yellowness of the skin, tissues and secretions, due to deposition of bile pigments in the blood. Many herbalists treated jaundice with indigenous herbs, which were free from side effects and kept this information secret.

This study was aimed to document some traditional medicinal plants used for curing jaundice among the tribal people of Visakhapatnam district, Andhra Pradesh. The district lies between 17°15' and 18°32' N and 81°54' and 83°30' E (Fig. 1). The study area consists of 11 mandals comprising 618,500 tribal population, that is 14.42% of the total district population (Census, 2011). The predominant tribes are *Bagata*, *Kondadora*, *Valmiki*, *Kondakammara*, *Kotia*, *Mukadora*, *Gadaba*, *Porja* and *Khond*. Though there are publications on jaundice from different parts of India (Raju and Rao, 1990; Singh and Prakash,

1998; Borthakur *et al.*, 2004; Rao *et al.*, 2007; Badgujar and Patil, 2008; Binu, 2009; Sarkar and Das, 2010; Manjula *et al.*, 2011; Suneetha *et al.*, 2013; Naidu and Reddi, 2014; Bhattacharyya *et al.*, 2015; Wagh and Jain, 2016; Swamy and Reddi, 2018; Majumdar *et al.*, 2019), exclusive studies on the tribes of Visakhapatnam district are not observed resulting in the present study.

2. Materials and Methods

The data presented here are the outcome of an extensive folklore survey undertaken in Visakhapatnam district (Fig. 1a) during 2006-10 in 86 interior tribal pockets with good forest cover and by consulting 60 Vaidyas. Tribal healers give *pasaru mandu* (medicine) depending on the severity of the ailment. Generally, medicine will be given to the patients in the morning and advised to follow diet restrictions. During the period of treatment, patients were advised not

to take non-vegetarian food and allowed to eat only rice with butter milk or starch water without salt and oil. Field visits were made along with medicine men to identify plants in the field and to know the local names. All the specimens were taxonomically identified and deposited in the Herbarium, Department of Botany, Andhra University, Visakhapatnam.

3. Results and Discussion

In total 66 plant species belonging to 61 genera and 40 families under 85 practices are utilized for treating jaundice by tribal populace of Visakhapatnam district. Euphorbiaceae is the dominant family with 5 species followed by Asclepiadaceae (4 spp.), Liliaceae, Cucurbitaceae, Caesalpiniaceae, Apocynaceae, Solanaceae (3 spp. each), Mimosaceae, Nyctaginaceae, Verbenaceae, Lamiaceae, Asteraceae, Convolvulaceae, Portulacaceae, Fabaceae, Combretaceae (2 spp. each) and others with one species each. Habit-wise analysis showed the dominance of herbs with 31 species followed by trees (18 spp.), shrubs (9 spp.) and climbers (8 spp.). Plant part-wise analysis showed the maximum utilization of leaf in 27 practices followed by root (23), whole plant (10), stem bark and fruit (7 each), rhizome and stem (3 each), seed (2) and tuber, flower and root bark one each. Of the 85 practices 53 involve single plant only followed by 19 with two plants, 5 with three plants, 4 with four plants, 2 with seven plants and 1 each with six and eight plants. They are administered in different formulations as infusion, paste, powder, decoction, extract, juice, pill, along with water, milk, cow milk, butter milk, curd, rice washed water, rice cooked water, jaggery, sugar or honey. In majority of the cases, fresh preparations are administered to avoid other complications of the drug caused due to storage. The age of the plant and part to be used is also a valuable factor while selecting them as drugs. In some cases, young parts or buds are found to be useful. The study documented 46 new medicinal practices (Jain, 1991; Kirtikar and Basu, 2003).

The species are arranged alphabetically with the botanical name followed by local name, family, part(s) used and method of administration (Fig 1b-e) are presented in Table 1.

Plants used for similar purpose in different parts of India and Bangladesh are *Aloe vera*,

Andrographis paniculata, *Azadirachta indica*, *Boerhavia diffusa*, *Carica papaya*, *Cassia fistula*, *Eclipta prostrata*, *Phyllanthus amarus*, *Ricinus communis*, *Sesbania grandiflora*, *Solanum nigrum*, *Tinospora cordifolia*, *Tribulus terrestris* and *Zingiber officinale* by the Yanadi, Nakkala, Yerukala, Koya and Kattanayaka tribes of Chittoor district, Andhra Pradesh (Raju and Rao, 1990); *Andrographis paniculata*, *Azadirachta indica*, *Evolvulus alsinoides*, *Phyllanthus amarus*, *Portulaca oleracea*, *Ricinus communis* and *Solanum nigrum* by the Yanadi, Nakkala, Irula and Chenchu tribes of Chittoor district, Andhra Pradesh (Vedavathy et al., 1997); *Ricinus communis* by the tribes of Uttar Pradesh (Singh and Prakash, 1998); *Andrographis paniculata*, *Asparagus racemosus*, *Boerhavia diffusa*, *Carica papaya*, *Centella asiatica*, *Curcuma longa*, *Eclipta prostrata*, *Hemidesmus indicus* and *Mimosa pudica* by the Assamese, Ahoms, Bodos, Rabhas, Mishings, Karbis, Dimasas, Deoris ethnic groups of Assam (Borthakur et al., 2004); *Andrographis paniculata*, *Boerhavia diffusa*, *Leucas aspera*, *Phyllanthus amarus* and *Trianthema portulacastrum* by the Chenchu tribes of Nagarjuna Sagar Srisailam Tiger Reserve, Andhra Pradesh (Rao et al., 2007); *Andrographis paniculata*, *Boerhavia diffusa*, *Centella asiatica*, *Coccinia grandis*, *Phyllanthus amarus* and *Ricinus communis* by the Mullukuruma tribe of Wayanad district, Kerala (Silja et al., 2008); *Andrographis paniculata*, *Azadirachta indica*, *Curculigo orchinoides*, *Curcuma longa*, *Luffa acutangula*, *Oroxylum indicum* and *Solanum nigrum* by the Bhil, Gavit, Kokani, Mavachi, Padvi, Tadvi, Valvi and Vasave tribes of Jalgaon district, Maharashtra (Badgujar and Patil, 2008); *Phyllanthus amarus* and *Ricinus communis* by the Malappandaram, Urali, Malarrayan, Ulladan, Malavedan and Malakurava tribes of Pathanamthitta district of Kerala (Binu, 2009); *Achyranthes aspera*, *Aegle marmelos*, *Cassia fistula*, *Centella asiatica*, *Hemidesmus indicus*, *Phyllanthus amarus*, *Ricinus communis*, *Terminalia chebula* and *Tinospora cordifolia* by the people of 11 districts of Karnataka (Shiddmallayya et al., 2010); *Boerhavia diffusa*, *Cassia fistula* and *Tinospora cordifolia* by the Chakma, Marma and Tripura tribes of Chittagong Hill tracts of Bangladesh (Biswas

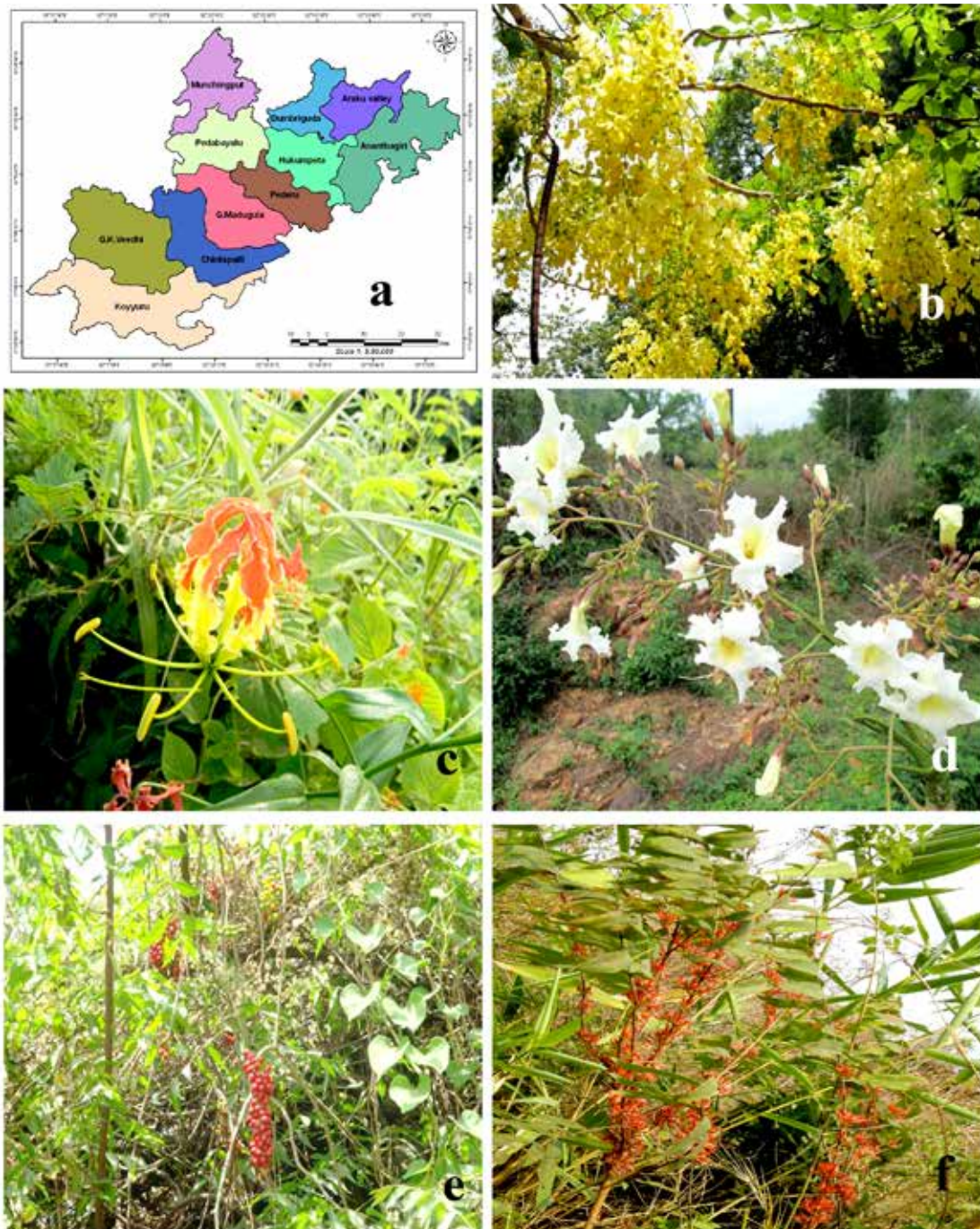


Fig. 1a. Study area; **Fig. 1b.** *Cassia fistula*; **Fig. 1c.** *Gloriosa superba*; **Fig. 1d.** *Oroxylum indicum*; **Fig. 1e.** *Tinospora cordifolia*; **Fig. 1f.** *Woodfordia fruticosa*

Table 1. Ethnobotanical plants used for treating jaundice by the tribes of Visakhapatnam district

Sl. No.	Name of the plant	Local name	Family	Part(s) used	Method of administration
1.	<i>Acacia rugata</i> (Lam.) Fawc. & Rendle	<i>Sikaya</i>	Mimosaceae	Fruit	*100 ml of pod decoction is administered once daily in empty stomach.
2.	<i>Acalypha indica</i> L.	<i>Kuppinta</i>	Euphorbiaceae	Leaf	*Leaves with those of <i>Justicia adhatoda</i> , <i>Eclipta prostrata</i> , <i>Centella asiatica</i> , <i>Phyllanthus amarus</i> , <i>Coccinia indica</i> and <i>Momordica charantia</i> are taken in equal quantities, ground and made into pills of 500 mg. 1 pill is administered with rice cooked water or buttermilk twice a day for 3 days. Two teaspoonful of leaf paste is administered with a cup of curd, daily once for 3 days.
3.	<i>Achyranthes aspera</i> L.	<i>Dhuchheru</i>	Amaranthaceae	Root	*Roots (5 g) are ground with those of <i>Prosopis spicigera</i> (2 g) made into pills (500 mg each) and 1 pill is administered twice a day along with buttermilk till it is cured.
4.	<i>Aegle marmelos</i> (L.) Correa	<i>Maredu</i>	Rutaceae	Leaf	20 ml of leaf decoction mixed with a pinch of dried ginger powder, long pepper and pepper of equal quantities are administered orally once a day.
5.	<i>Aloe vera</i> (L.) Burm. f.	<i>Kalabandha</i>	Liliaceae	Leaf	*Fleshy leaves are burnt and made into powder. 5 g of it mixed in water along with equal amounts of sugar crystals are given orally.
6.	<i>Andrographis paniculata</i> (Burm. f.) Nees	<i>Nelavemu</i>	Acanthaceae	Whole plant	*50 ml of whole plant decoction mixed with 2 g of dried ginger powder is administered twice a day for 5-7 days.
7.	<i>Argemone mexicana</i> L.	<i>Bala rakkasi</i>	Papaveraceae	Leaf	2 leaves free of thorns are pounded with water. Very small amount of paste is applied on the eyes as <i>kajal</i> twice a day for 3 days.
8.	<i>Asparagus racemosus</i> Willd.	<i>Pilli thegalu</i>	Liliaceae	Root	*4 tuberous roots are ground with 3 seeds of pepper and the paste is mixed in 500 ml of water and boiled. 20 ml of decoction is administered twice a day for 3 days. About 50 g each of tuberous roots with that of <i>Mirabilis jalapa</i> are eaten with sugar in empty stomach for 5 days during early stages of disease.
9.	<i>Azadirachta indica</i> A. Juss.	<i>Vepa</i>	Meliaceae	Stem bark	50 ml of stem bark decoction mixed with 1 spoonful of honey is administered daily in empty stomach.

10.	<i>Benincasa hispida</i> (Thunb.) Cogn.	<i>Budidagummadi</i>	Cucurbitaceae	Fruit	*50 ml juice of unripe fruit is administered once daily for 3 days in empty stomach.
11.	<i>Boerhavia diffusa</i> L.	<i>Atukamamidi</i>	Nyctaginaceae	Root, Leaf	Root and leaf juice (50 ml) is administered in empty stomach once a day till disease is cured. 10 g of root paste is administered twice daily for 7 days.
12.	<i>Bridelia montana</i> (Roxb.) Willd.	<i>Sankumanu</i>	Euphorbiaceae	Stem bark	*Stem bark mixed with that of <i>Pterocarpus marsupium</i> , <i>Oroxylum indicum</i> , <i>Terminalia alata</i> , <i>Cipadessa baccifera</i> and root tubers of <i>Rubia cordifolia</i> are made into decoction. 100 ml of it is administered daily once in empty stomach.
13.	<i>Carica papaya</i> L.	<i>Boppayi</i>	Caricaceae	Root	*Roots with those of <i>Jasminum sambac</i> and <i>Lawsonia inermis</i> ground with rice washed water and 50 ml is administered once in a day for 3 days.
14.	<i>Cassia fistula</i> L. (Fig. 1b)	<i>Rela</i>	Caesalpinaceae	Leaf, Fruit	Handful of leaves are ground and paste mixed with 100 ml of curd is administered twice a day for 3-5 days. 1 spoonful of fruit pulp is administered with 50 ml of sugarcane juice daily.
15.	<i>C. occidentalis</i> L.	<i>Tentapu</i>	Caesalpinaceae	Root	*Roots are ground with those of <i>Phyllanthus amarus</i> and 25 ml of extract mixed with equal quantity of milk is taken in empty stomach.
16.	<i>Centella asiatica</i> (L.) Urb.	<i>Saraswathiaaku</i>	Apiaceae	Whole plant	*Plant paste is made into pills of 1 g each. 2 pills are given thrice a day for 7 days. About 10-20 ml of the whole plant juice is given twice a day till it is cured.
17.	<i>Clerodendrum phlomidoides</i> L. f.	<i>Takkali</i>	Verbenaceae	Leaf	*1/4 spoonful of leaf paste mixed with 50 g of curd is taken for 3 days in empty stomach.
18.	<i>Coccinia grandis</i> (L.) Voigt	<i>Kakidonda</i>	Cucurbitaceae	Root	*Roots with tuberous roots of <i>Momordica dioica</i> and tender leaves of <i>Momordica charantia</i> are taken in equal quantities and ground with 10 g of jaggery and paste is made into pills (500 mg). 2 or 3 pills are administered thrice a day for 3 days.
19.	<i>Coleus amboinicus</i> Lour.	<i>Vamuaku</i>	Lamiaceae	Leaf	*2 to 3 drops of leaf juice is instilled into eyes daily once.

20.	<i>Cordia dichotoma</i> G. Forst.	<i>Banka nakkeri</i>	Boraginaceae	Leaf	3 spoonful of leaf juice mixed with a pinch of asafoetida is administered daily once before breakfast for 5 days.
21.	<i>Crinum asiaticum</i> L.	<i>Peddachalavadumpa</i>	Amaryllidaceae	Root	*About 50 g of raw tuberous roots are administered with a glass of water twice a day for 3 days. *Tuberous roots are ground along with those of <i>Rubia cordifolia</i> and <i>Asparagus racemosus</i> and whole plant of <i>Evolvulus alsinoides</i> in equal quantities. 1 spoonful of paste is administered twice daily.
22.	<i>Curculigo orchhioides</i> Gaertn.	<i>Nela tadi</i>	Hypoxidaceae	Root	20 g of root paste mixed with sugar is administered once daily in empty stomach.
23.	<i>Curcuma longa</i> L.	<i>Pasupu</i>	Zingiberaceae	Rhizome	10 g of rhizome paste mixed with half cup of curd made up of cow's milk is administered in the morning in empty stomach.
24.	<i>Eclipta prostrata</i> (L.) L.	<i>Nallaguntakalavari</i>	Asteraceae	Leaf	About 10-20 g of fresh leaf paste is given along with butter milk or water twice a day.
25.	<i>Euphorbia hirta</i> L.	<i>Nelajillu</i>	Euphorbiaceae	Whole plant	Whole plant with that of <i>Tridax procumbens</i> and jaggery taken in 2:2:1 ratio is made into paste. 10 g of this paste is administered for 7 days early in the morning in empty stomach.
26.	<i>Evolvulus alsinoides</i> L.	<i>Neelampuvvu</i>	Convolvulaceae	Leaf	*2 spoonful of leaf paste mixed with 1 spoonful of <i>Allium cepa</i> (big onion) juice is taken along with 50 ml of milk twice a day for 10 days.
27.	<i>Ficus benghalensis</i> L.	<i>Marri</i>	Moraceae	Leaf	*About 10 g of tender leaves ground with 10 g of bulbs of <i>Allium sativum</i> and 1 spoonful of paste is administered with 100 ml of cow's milk twice a day for 3 days.
28.	<i>Gloriosa superba</i> L. (Fig. 1c)	<i>Vanka vajram</i>	Liliaceae	Leaf	*2 leaves are ground into paste and mixed with 50 g of butter milk and administered orally.
29.	<i>Gymnema sylvestre</i> (Retz.) R. Br. ex Sm.	<i>Podapathri</i>	Asclepiadaceae	Root	*A spoonful of dried root powder is administered with 100 ml of water once a day for 6 days.

30.	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult.	<i>Avusugandhipaala</i>	Periplocaceae	Root	*Roots with those of <i>Lawsonia inermis</i> taken in equal quantities are ground with 2 spoonful of coconut water. 20 g of this paste is administered once a day for 3 days.
31.	<i>Holarrhena pubescens</i> Wall. ex G. Don	<i>Aku paala</i>	Apocynaceae	Stem bark	Stem bark is ground with that of <i>Azadirachta indica</i> and leaves of <i>Andrographis paniculata</i> in equal quantities with water. 50 ml of filtrate is mildly heated and administered once daily.
32.	<i>Hoya pendula</i> Wight & Arn.	<i>Paala theega</i>	Asclepiadaceae	Root, Leaf	*1 spoonful of root pounded with water is administered orally once daily. 1 spoonful of leaf juice is given to children.
33.	<i>Leucas aspera</i> (Willd.) Link	<i>Tummi</i>	Lamiaceae	Leaf, Flower	*Leaf paste and 2 spoonful of sugar mixed in 50 ml of water is administered daily thrice till disease is cured. Tender leaf and flower juice mixed with that of flower powder of <i>Tamarindus indica</i> is given in 20 g dose once a day for 4 days. *Leaf juice is applied as <i>kajal</i> .
34.	<i>Luffa acutangula</i> (L.) Roxb.	<i>Chedubeera</i>	Cucurbitaceae	Fruit	2 to 3 drops of fruit juice is instilled into the nostrils and inhaled.
35.	<i>Mimosa pudica</i> L.	<i>Kunukurodda</i>	Mimosaceae	Leaf	Leaves with roots of <i>Ziziphus oenoptia</i> , stem bark of <i>Oroxylum indicum</i> , roots of <i>Rubia cordifolia</i> , leaves of <i>Phyllanthus amarus</i> , tuberous roots of <i>Mirabilis jalapa</i> and leaves and tuberous roots of <i>Asparagus racemosus</i> are taken in equal quantities and ground. 20 g of paste is administered with 50 ml of hot water before meals thrice a day for 3 days.
36.	<i>Mirabilis jalapa</i> L.	<i>Poddhupoolu</i>	Nyctaginaceae	Leaf, Root	*10 g of dried leaf powder with a glass of water is administered twice a day for 3 days. Tuberous roots with those of <i>Asparagus racemosus</i> , roots of <i>Rubia cordifolia</i> and stem bark of <i>Oroxylum indicum</i> are taken in equal quantities and ground with rice washed water, salt and sugar. 50 g of paste is administered once a day for 5 days. *Root tuber is ground with that of <i>Colocasia esculenta</i> and 1 spoonful of paste is administered daily twice in empty stomach.
37.	<i>Operculina turpethum</i> (L.) Silva Manso	<i>Tella tegada</i>	Convolvulaceae	Root	2 g of root powder mixed with equal quantity of sugar and little honey is taken orally twice a day.

38.	<i>Oroxylum indicum</i> (L.) Kurz (Fig. 1d)	<i>Pumpena</i>	Bignoniaceae	Stem bark	Stem bark with tuberous roots of <i>Mirabilis jalapa</i> are taken in equal quantities and ground. 2 spoonful of paste with 100 ml of butter milk is administered twice a day for 1 week. 10 g of stem bark is ground with 2 g of turmeric. 1 spoonful of paste is administered twice daily for 5 days.
39.	<i>Oxystelma secamone</i> K. Schum.	<i>Dudhilatha</i>	Asclepiadaceae	Root	Root juice (10-15 ml) mixed with 100 ml of lukewarm water is given twice daily for 10 days in chronic liver problems.
40.	<i>Phyllanthus amarus</i> Schum. & Thonn.	<i>Nelausiri</i>	Euphorbiaceae	Whole plant, Root, Leaf	20 g of whole plant paste mixed with 100 ml of milk/butter milk is administered before breakfast once a day for 3 days. Roots are ground with the stem bark of <i>Oroxylum indicum</i> and 20 g of extract is taken orally daily once.
41.	<i>Piper longum</i> L.	<i>Pippallu</i>	Piperaceae	Fruit	1 g of fruit powder mixed with 5 g of jaggery is taken internally.
42.	<i>Plumeria alba</i> L.	<i>Nooruvarahalu</i>	Apocynaceae	Stem	*10 g of stem with equal quantity of tuberous roots of <i>Mirabilis jalapa</i> are crushed, mixed in 100 ml of lukewarm water and administered once a day for 3 days. Leaves with those of <i>Physalis minima</i> are taken in equal quantities and ground with castor oil and the paste is rubbed all over the body before taking bath and also 2 spoonful of paste is administered orally before breakfast (between 5 and 8 AM) for 3 days. Stem with stem bark of <i>Cascabela thevetia</i> , tuberous roots of <i>Asparagus recemosus</i> and <i>Mirabilis jalapa</i> are taken in equal quantities and ground. 20 g of paste mixed in 100 ml of lukewarm water is administered twice a day for 3 days.
43.	<i>P. rubra</i> L.	<i>Lakshmi poolu</i>	Apocynaceae	Stem	*Stem with that of <i>Ficus religiosa</i> and <i>Tamarindus indica</i> (1:1:1) are made into paste. 2 spoonful of paste is administered with a glass of water once a day for 3 days, meanwhile 5 or 6 drops of milky latex is applied around the navel during early stages.
44.	<i>Portulaca oleracea</i> L.	<i>Pappukura</i>	Portulacaceae	Whole plant	*2 spoonful of dried whole plant powder mixed in 50 ml of hot water is administered before breakfast for 1 week.
45.	<i>P. quadrifida</i> L.	<i>Avilaku</i>	Portulacaceae	Leaf	*3 spoonful of leaf juice is administered daily once for 4 days.
46.	<i>Psoralea corylifolia</i> L.	<i>Bavanchalu</i>	Fabaceae	Seed	*0.5 g of seed powder mixed with 10 ml of whole plant juice of <i>Trianthema portulacastrum</i> is administered twice daily.

47.	<i>Ricinus communis</i> L.	<i>Amudamu</i>	Euphorbiaceae	Root Leaf	5 g of root powder is taken along with honey, daily early in the morning in empty stomach till it is cured. 10 leaves are ground along with 20 pepper grains and paste is made into pills (500 mg). 1 pill is given once a day till disease is cured. *5 g of root powder mixed with honey is administered orally or 10 leaves pounded with 20 pepper grains and paste is administered orally.
48.	<i>Rubia cordifolia</i> L.	<i>Mangali kathi</i>	Rubiaceae	Root	Tuber paste mixed with that of <i>Mirabilis jalapa</i> is made into pills (500 mg). 1 pill is taken along with water daily thrice till it is cured. Roots with those of <i>Hemidesmus indicus</i> taken in equal quantities are ground and the paste is made into pills (500 mg). 2 pills are administered once a day for 3 days.
49.	<i>Rumex vesicarius</i> L.	<i>Chukka kura</i>	Polygonaceae	Whole plant	*5-10 ml of fresh plant juice mixed in 250 ml of butter milk is administered thrice a day.
50.	<i>Sesbania grandiflora</i> (L.) Pers.	<i>Avisa</i>	Fabaceae	Stem bark	2 spoonful of stem bark paste mixed in 100 ml of water is administered twice a day for 3 days.
51.	<i>Smilax zeylanica</i> L.	<i>Kummaribaddu</i>	Smilacaceae	Root	*A spoonful of tuberous root extract mixed in 50 ml of water is administered before breakfast for 3 days.
52.	<i>Solanum nigrum</i> L.	<i>Jajikura</i>	Solanaceae	Leaf	*10 g of leaves with those of <i>Phyllanthus amarus</i> , <i>Coccinia indica</i> , <i>Centella asiatica</i> , <i>Solanum nigrum</i> , <i>Justicia adhatoda</i> , <i>Momordica charantia</i> and <i>Eclipta alba</i> are ground into paste and mixed with 100 ml of buttermilk and administered daily twice in empty stomach (It reduces severe symptoms of blood in the urine and yellowness of urine).
53.	<i>S. torvum</i> Sw.	<i>Dhungiri</i>	Solanaceae	Fruit	*Dried fruits are made into powder. 1 spoonful of powder is administered early in the morning in empty stomach for 7 days.
54.	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	<i>Ratnama</i>	Verbenaceae	Leaf	*Young leaves crushed with sugar are made into pills (200 mg) and 1 pill is given thrice a day.
55.	<i>Tamarindus indica</i> L.	<i>Chintha</i>	Caesalpinaceae	Leaf	*Quarter cup of tender leaf decoction is given twice a day.
56.	<i>Terminalia alata</i> Wall.	<i>Nallamaddi</i>	Combretaceae	Stem bark	*Stem bark mixed with that of <i>Oroxylum indicum</i> and whole plant of <i>Phyllanthus amarus</i> are made into decoction. 50 ml of it is administered daily once in empty stomach.
57.	<i>T. chebula</i> Retz.	<i>Karakkai</i>	Combretaceae	Fruit	*Equal parts of fruits, honey and jaggery are ground and made into pills (500 mg). 1 pill is given once a day.

58.	<i>Tinospora cordifolia</i> (Willd.) Miers (Fig. 1e)	<i>Thippatheega</i>	Menispermaceae	Leaf	1 spoonful of fresh leaf paste is administered along with butter milk.
59.	<i>Trianthema portulacastrum</i> L.	<i>Tella Galijeru</i>	Aizoaceae	Whole plant, Leaf	Leaves or whole plant is crushed and filtered. 50 ml of juice mixed with curd is administered daily twice for 5-9 days.
60.	<i>Tribulus terrestris</i> L.	<i>Palleru</i>	Zygophyllaceae	Whole plant	Whole plant with that of <i>Amaranthus tricolor</i> taken in equal amount is made into paste. 2 spoonful of paste mixed in 100 ml of cow milk is administered in the morning in empty stomach for 7 days.
61.	<i>Tridax procumbens</i> L.	<i>Ganti mandhu</i>	Asteraceae	Whole plant	*Whole plant with that of <i>Euphorbia hirta</i> mixed with 2 years old jaggery (1:1:2) is ground. 1 spoonful of paste is taken daily in empty stomach for 1 week.
62.	<i>Tylophora indica</i> (Burm. f.) Merr.	<i>Asthma theega</i>	Asclepiadaceae	Root	*Root paste is applied on eye lids for 3 days to reduce jaundice during early stages.
63.	<i>Withania somnifera</i> (L.) Dunal	<i>Aswagandha</i>	Solanaceae	Seed	*1 spoonful of seed paste mixed with 2 drops of honey is administered twice daily for 1 month.
64.	<i>Woodfordia fruticosa</i> (L.) Kurz (Fig. 1f)	<i>Jaji</i>	Lythraceae	Stem bark	*Stem bark with those of <i>Mangifera indica</i> , <i>Oroxylum indicum</i> and <i>Bauhinia racemosa</i> are taken in equal quantities and 2 spoonful of fresh extract is administered in the morning and evening for 7 days.
65.	<i>Ximenea americana</i> L.	<i>Kondanakkera</i>	Olacaceae	Root bark	*About 50 g of root bark ground with 5 seeds of pepper are made into pills (200 mg). 2 pills are administered twice a day for 2 days.
66.	<i>Zingiber officinale</i> Roscoe.	<i>Allamu</i>	Zingiberaceae	Rhizome	Rhizome powder with fruit powder of <i>Embllica officinalis</i> taken in equal amounts are mixed with water and honey. 1 - 2 spoonful of this extract is administered in the early morning till disease is cured. *Equal quantities of rhizome and 2 years old jaggery are ground into paste and 1 spoonful of it is administered early in the morning in empty stomach for 7 days.

*New medicinal practices

et al., 2010); *Azadirachta indica*, *Hemidesmus indicus*, *Leucas aspera*, *Phyllanthus amarus*, *Piper longum*, *Tamarindus indica* and *Tinospora cordifolia* by the folklore of Chikmagalur district of Karnataka (Prakasha et al., 2010); *Argemone mexicana*, *Boerhavia diffusa* and *Trianthema portulacastrum* by the Gond, Kol, Baiga, Panica, Khairwar, Manjhi, Mawasi and Agaria tribes of Rewa district, Madhya Pradesh (Shukla et al., 2010); *Oroxylum indicum* by the Mech tribe in Duars of West Bengal (Sarkar and Das, 2010) and *Lotha-Naga* tribe of Wokha district, Nagaland (Jamir et al., 2010); *Acalypha indica*, *Andrographis paniculata*, *Asparagus racemosus*, *Azadirachta indica*, *Cassia fistula*, *Cordia dichotoma*, *Holarrhena pubescens*, *Leucas aspera*, *Luffa acutangula*, *Tridax procumbens* by the Koya, Lambada, Gond/Naikpod, Yerukula, Nayak and Kondareddi tribes of Khammam district, Andhra Pradesh (Manjula et al., 2011); *Acalypha indica*, *Andrographis paniculata*, *Azadirachta indica*, *Carica papaya*, *Cordia dichotoma*, *Crinum asiaticum*, *Curculigo orchioides*, *Curcuma longa*, *Holarrhena pubescens*, *Mirabilis jalapa*, *Oroxylum indicum*, *Phyllanthus amarus*, *Portulaca oleracea*, *Ricinus communis* and *Tinospora cordifolia* by the Kondareddi, Kondadora, Koyadora, Kondakammara, Kondakapu, Mannedora and Valmiki tribes of East Godavari district, Andhra Pradesh (Suneetha et al., 2013); *Andrographis paniculata*, *Azadirachta indica*, *Boerhavia diffusa*, *Centella asiatica*, *Eclipta prostrata*, *Evolvulus alsinoides*, *Operculina turpethum*, *Phyllanthus amarus*, *Portulaca oleracea*, *Ricinus communis*, *Solanum torvum*, *Tamarindus indica*, *Tribulus terrestris* and *Woodfordia fruticosa* by the Savara, Jatapu, Kondadora, Gadaba, Kuttiya and Yerukala tribes of Srikakulam district, Andhra Pradesh (Naidu and Reddi, 2014); *Achyranthes aspera*, *Aegle marmelos*, *Aloe vera*, *Azadirachta indica*, *Carica papaya*, *Centella asiatica*, *Oroxylum indicum*, *Piper longum* and *Tinospora cordifolia* by the Bhumij, Garh, Goala, Kalindi, Kaul, Kharia, Kurmi, Munda, Orang, Oriya, Santhal, Sundi and Telanga tribes of Nagaon district, Assam (Bhattacharyya et al., 2015); *Eclipta prostrata*, *Phyllanthus amarus* and *Ricinus communis* by the Gond, Madia, Pardhan and Kanwar tribes

of Gadchiroli district, Maharashtra (Bhogaonkar and Saudagar, 2015); *Andrographis paniculata*, *Argemone mexicana*, *Boerhavia diffusa*, *Holarrhena pubescens*, *Phyllanthus amarus*, *Solanum nigrum*, *Tinospora cordifolia* and *Woodfordia fruticosa* by the Bhil, Bhilala and Pataya tribes of Jhabua district, Madhya Pradesh (Wagh and Jain, 2016); *Argemone mexicana*, *Boerhavia diffusa* and *Tinospora cordifolia* by the Baiga tribe of Dindori district, Madhya Pradesh (Ahirwar, 2017); *Oroxylum indicum* and *Phyllanthus amarus* by the Lodha tribe of West Bengal (Chaudhury et al., 2018); *Acalypha indica*, *Boerhavia diffusa*, *Curculigo orchioides*, *Eclipta prostrata*, *Euphorbia hirta*, *Evolvulus alsinoides*, *Phyllanthus amarus*, *Portulaca oleracea*, *Ricinus communis*, *Tinospora cordifolia*, *Tribulus terrestris* and *Woodfordia fruticosa* by the Gond, Kolam, Koya, Lambada, Manne, Naikpod, Pradhan, Thoti and Yerukala tribes of Adilabad district, Andhra Pradesh (Swamy and Reddi, 2018) and *Achyranthes aspera*, *Andrographis paniculata*, *Azadirachta indica*, *Boerhavia diffusa*, *Carica papaya* and *Terminalia chebula* by the Koch tribe of South-West Garo hills district of Meghalaya (Majumdar et al., 2019). It is observed that the whole herb/plant is valued more by the tribal medicine men than the sum total of its parts. It also appears that the active constituents of many herbs interact in complex ways to produce the therapeutic effect remedy as a whole. This however needs further research.

4. Conclusion

Ethnomedicines or folk drugs are initially administered through trial and error and later with judicious selection, experimentation and utilization of plants for human medicine made notable advances. The present study establishes the repeated application of some plants for jaundice in tribal system of medicine in India (Table 2). Thus the modern systems of medicine have their roots, in one way or the other, from the folk uses or tribal system of medicine.

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Table 2. Most useful plants used widely for treating jaundice

Sl. No.	Plant species
1.	<i>Andrographis paniculata</i>
2.	<i>Argemone mexicana</i>
3.	<i>Azadirachta indica</i>
4.	<i>Boerhavia diffusa</i>
5.	<i>Carica papaya</i>
6.	<i>Eclipta prostrata</i>
7.	<i>Holarrhena pubescens</i>
8.	<i>Phyllanthus amarus</i>
9.	<i>Ricinus communis</i>
10.	<i>Solanum nigrum</i>
11.	<i>Tinospora cordifolia</i>
12.	<i>Tribulus terrestris</i>
13.	<i>Woodfordia fruticosa</i>

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