



Importance of Botanical Identities of Plants Quoted For the Treatment of Liver Cirrhosis in Charaka SaṃHitā

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ABSTRACT

The present paper intensively worked to recognize the correct botanical identities (most probable) of plants quoted only in Sanskrit names for the treatment of *Yakrutudara*, *Kumbha-kāmalā*, *Halimak* and *Rakta-pitta Cikitsā* (collectively grouped under Liver Cirrhosis stages) in the great Āyurvedic treatise, the *Charaka-saṃhitā* also spelt as *Caraka-saṃhitā*. The botanical identification of medicinal plants mentioned in the Sanskrit texts is not unanimous because of differential interpretation of the synonyms and also for the scribal variations found in the multiple sources of the texts. The use of different plant species for the same plant drug recipe of the text by manufacturers and practitioners has limited confirmatory clinical outcomes. The coordinated attempt to study the Chapters of the texts with review of Sanskrit-botanical literature here, enlisted correct identities of 160 plant species belonging to 70 angiosperm families. The text has actually quoted a total of 195 Sanskrit named plants with the synonyms. It has been further found by a survey that 70 percent of these Sanskrit named plant parts are used by Āyurvedic practitioners to treat the patients identified with Liver-Cirrhosis symptoms. The present data will certainly aid the drug manufacturers and practitioners to use botanically correct plant species that could enhance the efficacy of the drugs.

Key words: Botanical Identification, Charaka-saṃhitā, Halimak, Kumbha-kāmalā, Liver-Cirrhosis, Rakta-pitta Cikitsā, Yakrutudara.

INTRODUCTION

Traditional knowledge of medicinal plants and their treatment methods in India are rooted in Āyurvedic Compendia (*Sanskrit Medical Treaties*) and in the unscripted dialects of the people in India. *Caraka-saṃhitā*, calculatedly compiled between 7th century BC and 6th century CE delved into all aspects of medicine, including the logic and philosophy behind the Indian medicinal system with special emphasis on the diagnosis of disease and treatment part.^{1,2}

Most of the diseases as understood in medical terminologies today were explained in Sanskrit words conveying similar meanings and symptoms in Āyurvedic texts. Considering the importance of liver and the necessity of its normal functioning for healthy human being, a coordinated effort was made to understand the correct plant species expressed in Sanskrit words or in synonyms for use in treatments of liver cirrhosis to open a new future. Liver Cirrhosis is the scarring of liver that happens because of chronic liver disease. Scar tissue blocks blood and bile flow through the liver and keeps it from working as it should. In patients with Cirrhosis and end-stage liver disease, medications may be required to control the amount of protein absorbed in the diet. The liver affected by Cirrhosis may not be able to metabolize the waste products, resulting in elevated blood ammonia levels and hepatic encephalopathy³. Early symptoms of Cirrhosis may

include: fatigue and loss of energy, loss of appetite and weight loss, nausea or abdominal pain, red-spots may develop on the skin. As Cirrhosis progresses to a later stage, patients may develop some complications like; Edema and Ascites, Jaundice, Variceal Hemorrhage, Hepatic Encephalopathy, Splenomegaly, Shortness of breath, Kidney failure, and Liver-cancer etc ^{2,4,5}.

In the text of *Caraka-Saṃhitā* of Āyurveda, the symptoms of Liver Cirrhosis are compared with the symptoms of *Udara-roga* (chapter 13/35-38th shloka), *Pāṇḍuroga* (chapter 16/ 37th and 133th shloka), *Rakta-Pitta* (chapter 4/25-28th shloka) ¹ and these verses were critically reviewed to derive Sanskrit plant names, enlist them and assign these plants to the most probable botanical identity.

Āyurveda texts are composed in general following synonymical names of plants in Sanskrit, whereas the modern taxonomic systems describe plants by their binomial nomenclature forms only. It has been observed many a times that, a single Sanskrit plant name is assigned to distant botanical species at different times and literature. So it becomes difficult to ascertain the correct botanical identity of the plants that a Āyurvedic text is referring to. Secondly, due to absence of total plant as physical specimen or detailed morphological descriptions (necessary for botanical identification) in lexicons (Nighantus), it again becomes troublesome to correlate Sanskrit named plants and their correct botanical identifications. These medicinal plants / plant parts in modern usage as drugs need their exact botanical identification for better efficacy from the preparations.⁶

The attempt to find the present uses of plant drugs by Āyurveda practitioners in the treatment of Liver Cirrhosis adds strength to this study. A complete list of plants with correct botanical identity and proper written form of the Sanskrit names would encourage future coordinated effort and plant conservation approaches.

MATERIALS AND METHODS

The compendium '*Caraka-Saṃhitā*' considered for the present study was the 9th edited copy of Chaukhamba Orientalia, Varanasi of Prof. Priyavrat Sharma, written in Sanskrit with explanations in English in Four Volumes¹. A list of plant names was made from the study after analyzing the verses (paragraphs) from the text described for *Yakrutudara*, *Pāṇḍuroga* (*Kumbha-kāmalā* and *Halīmak*), *Rakta-pitta Cikitsāsthana*, which have treatments for the symptoms similar to the major complications of Liver-Cirrhosis.

The classical Āyurvedic texts¹ and lexicons⁷ along with the modern work on Āyurveda such as commentaries on the same texts, Āyurveda based journals^{2,8-14}, Indian Materia Medica^{3,15}, Glossaries of Indian Medicinal Plants¹⁵⁻¹⁹, Databases on Indian Medicinal Plants^{3,10,14-16,19}, that have done correlation work of Sanskrit plant names and botanical names were considered to ascertain correct botanical identities to Sanskrit named plant species. A detailed literature survey was carried out from various references and texts, including the official API and AFI^{20,21}. The most probable botanical identifications were arrived at as per the maximum agreement of a name by the describer / authors (in the parentheses of the table) and also by adhering to the latest taxonomic principles of nomenclature of ICBN. The details of the study and identifications are presented in tabular format.

A survey of Āyurvedic practitioners (using Random Sampling Method) was done in the locality to find out the reality between textual plant names and practically used plants for the treatment of liver cirrhosis symptoms/disease.

OBSERVATION AND RESULTS

Table 1: List of plant names in Sanskrit and their botanical identities

Sr. No.	Botanical Name (most probable) with plant authority & Family	Sanskrit Name (s) in the Text	Official Name (as per AFI/API) ^{20,21}
1	<i>Acacia catechu</i> (Linn F) Willd (Leguminosae) ^{3,15,18-21}	Khadira	Khadira
2	<i>Achyranthes aspera</i> Linn Syn <i>Achyranthes aspera</i> Roxb (Amaranthaceae) ^{3,10,15,18-21}	Apāmārga	Apāmārga
3	<i>Aconitum heterophyllum</i> Wall Ex Royle (Ranunculaceae) ^{3,10,18,20,21}	Atīviśā	Atīviśā
4	<i>Acorus calamus</i> L (Aracea) ^{3,10,15,18-21}	Vacā	Vacā
5	<i>Adhatodavasica</i> Nees Syn <i>Justicia adhatoda</i> L Syn <i>Adhatodazeylanica</i> L (Acanthaceae) ^{3,10,15,18-21}	Vāsā	Vāsā
6	<i>Aeglemarmelos</i> (L) Correa Ex Schultz (Rutaceae) ^{3,10,15,18-21}	Bilva	Bilva
7	<i>Alhagi pseudalhagi</i> (Bieb) Desv Syn <i>A Camelorum</i> Fisch Ex DC <i>Amaurorum</i> Medic (Papilionaceae; Fabaceae) ^{3,10,18,20,21}	Yavāsaka Durālabhā	Yavāsaka
8	<i>Allium cepa</i> Linn (Liliaceae) ^{3,18,19}	Palāṇḍu	
9	<i>Amaranthus spinosus</i> Linn (Amaranthaceae) ^{15,18}	Taṇḍulīya	
10	<i>Anethum sowa</i> Roxbex Flem Syn <i>A graveolens</i> Linn Var sowa Roxb <i>AGraveolens</i> DC <i>Peucedanum sowa</i> Roxb <i>Peucedanum graveolens</i> Benth (Umbelliferae; Apiaceae) ^{10,15,18,20,21}	Śatāhvā	Śatāhvā
11	<i>Areca catechu</i> Linn (Palmae) ¹⁸⁻²¹	Kramuka	Pūga
12	<i>Argemone Mexicana</i> Linn (Papaveraceae) ^{3,18}	Swarṇakṣīrī	
13	<i>Arundo donax</i> Linn (Gramineae; Poaceae) ¹⁸	Nala	
14	<i>Asparagus racemosus</i> Willd (Liliaceae) ^{3,15,18-21}	Śatavarī	Śatavarī

15	<i>Azadirachtaindica</i> A Juss (Meliaceae) ^{3,10,15,18-21}	Nimba	Nimba
16	<i>Baliospermum montanum</i> Muell Arg (Euphorbiaceae) ^{3,10,15,18-21}	Daṅṭī	Daṅṭī
17	<i>Bambusa bambos</i> (L) Voss Syn <i>Barundinaceae</i> (Retz) Roxb <i>Arundobambos</i> L (Gramineae, Poaceae) ^{3,18}	Vaṃśalocana Tugā	
18	<i>Barringtonia acutangula</i> (Linn) Gaertn Syn <i>Eugenia acutangula</i> L (Lecythidaceae; Barringtoniaceae) ^{18,20,21}	Nicula	Nicula
19	<i>Bauhinia variegata</i> Linn (Caesalpiniaceae) ^{15,18}	Kovidāra Kachnār	
20	<i>Berberisaristata</i> DC Sub sp <i>B asiatica</i> Roxb ex DC (Berberidaceae) ^{3,10,15,18-21}	Dāruharidrā Darvī	Dāruharidrā
21	<i>Boerhaviadiffusa</i> Linn Syn <i>B repens</i> Linn <i>B procumbens</i> Roxb (Nyctaginaceae) ^{3,10,15,18-21}	Punarnavā	Punarnavā
22	<i>Butea monosperma</i> (Lam) Kuntze Syn <i>B frondosa</i> Roxb (Fabaceae) ^{3,15,18-21}	Palāśa	Palāśa
23	<i>Calamus rotang</i> Linn Syn <i>C roxburghii</i> Griff (Arecaceae) ^{15,18,20,21}	Vetra	Vetra
24	<i>Callicarpamacrophylla</i> Vahl Syn <i>C incana</i> Roxb (Verbenaceae) ^{3,10,18,20,21}	Priyaṅgu	Priyaṅgu
25	<i>Calotropis procera</i> (Ait) R Br Sub sp <i>Hamiltonii</i> (Wight) Ali (Asclepiadaceae) ^{15,18-21}	Arka	Arka
26	<i>Capparis zeylanica</i> Linn F Syn <i>C sepiaria</i> Linn (Capparidaceae) ^{18,20,21}	Vyāghranakha	Vyāghranakha
27	<i>Carum carvi</i> Linn (Umbelliferae) ^{3,10,15,18-21}	Kāravī	Kṛṣṇa jīraka
28	<i>Cassia fistula</i> Linn Syn <i>C rhombifolia</i> Roxb (Caesalpiniaceae) ^{3,10,15,18-21}	Āragvādha	Āragvādha
29	<i>Cedrus deodara</i> (Roxb) Loud Syn <i>C libani</i> Barrel var <i>deodara</i> Hook	Devadāru	Devadāru

	F (Pinaceae) ^{3,10,15,18,20,21}		
30	<i>Centella asiatica</i> (Linn) Urban (Apiaceae) ¹⁸⁻²¹	Maṇḍūkapaṇṇī	Maṇḍūkapaṇṇī
31	<i>Chenopodium album</i> Linn (Chenopodiaceae) ¹⁸	Vāstūka	
32	<i>Cinnamomum tamala</i> (Lauraceae) ^{3,18}	Patra Trigandha	
33	<i>Cinnamomum zeylanicum</i> Blume Syn <i>C verum</i> Presl (Lauraceae) ^{3,18-21}	Twak Trigandha	Tvak
34	<i>Cissampelos pareira</i> L var <i>hirsute</i> Buch Ham Ex DC (Menispermaceae) ^{3,10,18-21}	Pāṭhā	Pāṭhā
35	<i>Citrus medica</i> Linn (Rutaceae) ^{10,18,20,21}	Mātulunga Bījapūra	Bījapūra
36	<i>Clerodendrum phlomidis</i> Linn F Syn <i>C multiflorum</i> (Burm F) <i>O kuntze</i> (Verbenaceae) ^{3,18-21}	Agnimantha	Agnimantha
37	<i>Clerodendrum serratum</i> (Linn) Moon (Verbenaceae) ^{3,10,18,20,21}	Bhargi	Bhāraṅgi
38	<i>Coleus forskohlii</i> Brig Syn <i>C barbatus</i> Benth (Lamiaceae) ^{18,20,21}	Gandīra	Gandīra
39	<i>Commiphora mukul</i> Engl Syn <i>C wightii</i> (Arnot) Bhandari Syn <i>Balsamodendron mukul</i> Hook Ex Stocks (Burseraceae) ^{3,10,15,18-21}	Guggulu	Guggulu
40	<i>Coriandrum sativum</i> L (Umbelliferae) ^{3,10,15,18-21}	Dhānyaka Dhanya	Dhānyaka
41	<i>Coscinium fenestratum</i> Colebr (Menispermaceae) ^{18,20,21}	Kālīyaka	Kālīyaka
42	<i>Ctenolepis cerasiformis</i> Naud (Cucurbitaceae) ¹⁸	Śaṅkhinī	
43	<i>Cuminum cyminum</i> L (Apiaceae) ^{3,15,18,20,21}	Jīraka	Śveta Jīraka
44	<i>Curcuma longa</i> L (Zingiberaceae) ^{3,10,15,18,20,21}	Haridrā	Haridrā
45	<i>Cymbopogon citrates</i> (DC) Stapf Syn <i>Andropogon citrates</i> DC (Poaceae) ^{3,18-21}	Bhūtīka Kattṛṇa	Kattṛṇa
46	<i>Cynodon dactylon</i> (Linn) Pers	Dūrvā	Dūrvā

	(Gramineae) ^{3,18-21}	Anantā	
47	<i>Cyperus rotundus</i> L (Cyperaceae) ^{3,10,15,18-21}	Mustā	Mustā
48	<i>Desmodium gangeticum</i> DC (Fabaceae) ^{3,10,18-21}	Śālaparṇī Pañcamūli	Śālaparṇī
49	<i>Desmostachya bipinnata</i> Stapf Syn <i>Eragrostis cynosuroides</i> Beauv (Gramineae) ^{18,20,21}	Kuśa	Kuśa
50	<i>Dolichos biflorus</i> Linn Syn <i>Vigna unguiculata</i> (L) Walp (Papilionaceae) ^{10,18,20,21}	Kulattha	Kulattha
51	<i>Echinochloa frumentacea</i> Link Syn <i>Panicum frumentaceum</i> Roxb (Gramineae) ¹⁸	Śyāmāka	
52	<i>Eclipta alba</i> (Linn) Hassk Syn <i>E prostrata</i> Roxb (Compositae) ^{3,10,18,20,21}	Bhṛīṅgarāja	Bhṛīṅgarāja
53	<i>Elettaria cardamomum</i> (Linn) R Br (Zingiberaceae) ^{3,18,20,21}	Elā Trigandha ∞	Sūkṣmailā
54	<i>Eleocharis dulcis</i> Trin Syn <i>E plantaginea</i> RBr <i>E tuberosa</i> Schult (Cyperaceae) ¹⁸	Śṛṅgāṭaka	
55	<i>Embeliaribes</i> Burm (Myrsinaceae) ^{3,15,20,21}	Viḍaṅga	Viḍaṅga
56	<i>Emblica officinalis</i> Gaertn Syn <i>Phyllanthus emblica</i> L (Euphorbiaceae) ^{3,10,18-21}	Āmalakī Triphalā©	Āmalakī
57	<i>Euphorbia neriifolia</i> auct Non Linn Syn <i>E ligularia</i> Roxb (Euphorbiaceae) ^{3,15,18-21}	Snuhī	Snuhī
58	<i>Euphorbia tirucalli</i> Linn (Euphorbiaceae) ¹⁸	Sātālā	
59	<i>Fagonia cretica</i> Linn Syn <i>F Arabica</i> Linn <i>F scheifurthii</i> Hadidi (Zygophyllaceae) ¹⁸⁻²¹	Duṛālabhā Dhanvayāsa	Duṛālabhā Dhanvayāsah
60	<i>Ferula foetida</i> Regel Syn <i>F asafetida</i> L (Apiaceae) ^{3,15,18,20,21}	Hingū	Hingū
61	<i>Ficus bengalensis</i> Linn (Moraceae) ^{15,18-21}	Nyagrodha	Nyagrodha
62	<i>Ficus lacor</i> Buch-Ham Syn <i>F infectoria</i> auct Non-Willd	Plakśa	Plakśa

	<i>F viren</i> Aiton (Moraceae) ^{18,20,21}		
63	<i>Ficus religiosa</i> Linn (Moraceae) ^{15,18-21}	Aśwattha	Aśvattha
64	<i>Ficus racemosa</i> Linn Syn <i>F glomerata</i> Roxb (Moraceae) ^{15, 18-21}	Udumbara	Udumbara
65	<i>Foeniculum vulgare</i> Mill (Umbellifera; Apiaceae) ^{3,15,18,20,21}	Śatāhvā Mīsreyā	Mīsreyā
66	<i>Fumariaparviflora</i> Lam Syn <i>F indica</i> (Hausk) Pugsley (Fumariaceae) ^{3,10,18,20,21}	Parpaṭaka	Parpaṭa
67	<i>Gentiana kurroo</i> Royle (Gentianaceae) ^{3,10,18,20,21}	Trāyamāṇā	Trāyamāṇā
68	<i>Glycyrrhiza glabra</i> L (Fabaceae) ^{3,10,15,18-21}	Madhuyaṣṭī Yaṣṭī Madhuyaṣṭikā	Yaṣṭī
69	<i>Gmelina arborea</i> Roxb Syn <i>Premna arborea</i> Roth (Verbenaceae) ^{3,10,15,18-21}	Kāśmarya	Gambhārī
70	<i>Grewia asiatica</i> auct Non L Syn <i>G subinaequalis</i> DC (Tiliaceae) ^{15,18}	Paruśaka	
71	<i>Habenaria intermedia</i> D Don (Orchidaceae) ^{18,20,21}	Ṛddhi	Ṛddhi
72	<i>Hemidesmus indicus</i> (L) R Br Syn <i>Periploca indica</i> Linn (Asclepiadaceae) ^{3,10,15,18-21}	Sārivā	Śveta Sārivā
73	<i>Hedychium spicatum</i> Ham ex Smith Syn <i>H album</i> Buch-Ham Ex Wall (Zingiberaceae) ^{3,10,18-21}	Śatī	Śatī
74	<i>Holarrhena antidysenterica</i> (Roth) DC (Apocyanaceae) ^{3, 18-21}	Kuṭaja	Kuṭaja
75	<i>Holarrhena antidysenterica</i> Wall (Apocyanaceae) ^{10,15,18,20,21}	Indrayava	Indrayava
76	<i>Holoptelea integrifolia</i> Planch (Ulmaceae) ¹⁸⁻²¹	Cirabilva	Cirabilva
77	<i>Hordeum vulgare</i> L Syn <i>H hexastichon</i> L (Poaceae) ^{10,18,20,21}	Yava Yavakṣāra	Yava
78	<i>Indigofera tinctoria</i> Linn (Fabaceae) ¹⁸⁻²¹	Nīlinī Nili	Nīlī
79	<i>Inula racemosa</i> Hook F	Puṣkara	Puṣkara

	Syn <i>I royleana</i> auct Non-DC (Compositae) ^{3,10,18,20,21}	Puṣkaramūla	
80	<i>Jatropha glandulifera</i> Roxb (Euphorbiaceae) ^{18,20,21}	Dravantī	Dravantī
81	<i>Juniperus communis</i> Linn var <i>saxatillis</i> Palias (Pinaceae) ^{3,18,20,21}	Hapuṣā	Hapuṣā
82	<i>Lens culinaris</i> Medic Syn <i>Lens esculenta</i> Moench (Papilionaceae) ^{10,18-21}	Masūra	Masūra
83	<i>Leptadenia reticulata</i> W & A (Asclepiadaceae) ^{18,20,21}	Kākoli Jivanti	Jivanti
84	<i>Lilium polyphyllum</i> D Don (Liliaceae) ¹⁹⁻²¹	Kākoli	Kākoli
85	<i>Madhuca indica</i> JFGmel (Sapotaceae) ^{10,18,20,21}	Madhūka	Madhūka
86	<i>Mallotus philippensis</i> Muell-Arg (Euphorbiaceae) ^{15, 18-21}	Kampillaka	Kampilla
87	<i>Mangifera indica</i> Linn (Anacardiaceae) ^{15, 18-21}	Āmra	Āmra
88	<i>Marsdeni tenacissima</i> Wight & Arn <i>Marsdenia roylei</i> Wight (Asclepiadaceae) ^{10,18,20,21}	Mūrvā	Mūrvā
89	<i>Mesua ferrea</i> Linn Syn <i>M nagassarium</i> (Burm F) Kosterm (Guttiferae) ^{3,15,18-21}	Nāgakeśara	Nāgakeśara
90	<i>Microstylis wallichii</i> Linn Syn <i>Malaxis acuminata</i> D Don (Orchidaceae) ^{18,20,21}	Ṛshabhaka Jīvaka	Jīvakah
91	<i>Mimosa pudica</i> Linn (Mimosaceae) ^{3,10,18-21}	Lajjālu	Lajjālu
92	<i>Moringa pterygosperma</i> Gaertn Syn <i>M oleifera</i> Lam (Moringaceae) ^{3,15,18-21}	Śigru Madhuśigru	Śigru
93	<i>Musa paradisiaca</i> Linn Syn <i>Msapientum</i> Linn (Musaceae) ¹⁸⁻²¹	Kadalī	Kadalī
94	<i>Myrica nagi</i> Hook F non-Thunb Syn <i>M esculenta</i> Buch –Ham ex Don (Myricaceae) ^{3,10,15,18,20,21}	Kaṭphala	Kaṭphala
95	<i>Nelumbo nucifera</i> Gaertn Syn <i>Nelumbium speciosum</i> Willd (Nymphaeaceae) ^{10,18-21}	Kamala	Kamala

96	<i>Nigella sativa</i> Linn (Ranunculaceae) ^{3,15,20,21}	Upakuñcikā	Upakuñcikā
97	<i>Nymphaea stellata</i> Willd (Nymphaeaceae) ^{18,20,21}	Nīlotpala Utpala	Utpala
98	<i>Operculinaturpethum</i> (L) Silva Manso Syn <i>Ipomoea turpethum</i> R Br Syn <i>Convolvulusturpethum</i> L (Convolvulaceae) ^{3,10,15,18-21}	Trivṛt Śyāmā	Trivṛt
99	<i>Oroxylum indicum</i> Vent (Bignoniaceae) ^{10,18-21}	Śyonāka	Śyonāka
100	<i>Oryza sativa</i> Linn (Poaceae) ^{10,15,18,20,21}	Nīvāra Śāli	Śāli
101	<i>Pergularia extensa</i> NEBr Syn <i>P daemia</i> (Forsk) Chiov (Asclepiadaceae) ^{3,18,20,21}	Viṣānikā	Viṣānikā
102	<i>Phaseolus radiatus</i> L Syn <i>Vigna radiata</i> (L) Wilczek (Fabaceae) ^{18,20,21}	Mudga	Mudga
103	<i>Phaseolus trilobus</i> sensu Ait & Auct Syn <i>Vigna trilobata</i> (Linn) Verdcourt (Fabaceae) ^{3,15,18,20,21}	Mudgaparnī	Mudgaparnī
104	<i>Phoenix dactylifera</i> (Araceae) ^{15,18,20,21}	Kharjūra	Kharjūra
105	<i>Picrorrhizakurroa</i> Royle ex Benth (Scrophulariaceae) ^{3,10,15,18,20,21}	Katurohinī Kaṭukā Ariṣṭa	Kaṭukā
106	<i>Piper chaba</i> Hunter Syn <i>P retrofractum</i> Vahl Syn <i>P officinarum</i> DC (Piperaceae) ^{3,10,15,18,20,21}	Cavya Pañcakolā	Cavya
107	<i>Piper longum</i> L (Piperaceae) ^{10,15,18-21}	Pippalī Pippalīmūla Trikaṭuṣ	Pippalī
108	<i>Piper nigrum</i> L (Piperaceae) ^{3,10,15,18-21}	Marica	Marica
109	<i>Pistacia chinensis</i> Burgo Subsp <i>integerrima</i> Stewart (Anacardiaceae) ^{10,18,20,21}	Karkaṭaśringī	Karkaṭaśringī
110	<i>Pluchea lanceolata</i> Oliver & Hiem (Asteraceae) ^{3,10,18,20,21}	Rāśnā	Rāśnā
111	<i>Plumbago zeylanica</i> L <i>P indica</i> L Syn <i>Prosea</i> L (Plumbaginaceae) ^{3,10,15,18-21}	Citraka Agastya Haritaki €	Citraka
112	<i>Prunus cerasoides</i> D Don	Padmaka	Padmaka

	Syn <i>P puddum</i> Roxb Ex Brandis Non-Miq (Rosaceae) ^{3,10,18,20,21}		
113	<i>Prunus avium</i> L (Rosaceae) ^{18,20,21}	Elavāluka	Elavālukam
114	<i>Pueraria tuberosa</i> DC (Fabaceae) ^{10,18-21}	Vidārī	Vidārī
115	<i>Punica granatum</i> L (Punicaceae) ^{10,15,18-21}	Dāḍima	Dāḍima
116	<i>Randia dumetorum</i> Poir Syn <i>R spinosa</i> Poir <i>R, brandisii</i> Gamble <i>R longispina</i> W & A <i>R tomentosa</i> W & A non Blume <i>Xeromphis spinosa</i> Keay (Rubiaceae) ^{3,18,20,21}	Madana	Madana
117	<i>Raphanus sativus</i> Linn (Cruciferae; Brassicaceae) ^{15,18-21}	Mūlaka Śāleya	Mūlaka
118	<i>Rhus parviflora</i> Roxb (Anacardiaceae) ^{18,20,21}	Tintiḍīka	Tintiḍīkah
119	<i>Ricinus communis</i> L (Euphorbiaceae) ^{3,10,15,18-21}	Eraṇḍa	Eraṇḍa
120	<i>Rosa centifolia</i> Linn (Rosaceae) ^{18,19}	Lākṣā	
121	<i>Rubiocordifolia</i> L Syn <i>R manjista</i> Roxb (Rubiaceae) ^{3,10,18-21}	Mañjiṣṭhā	Mañjiṣṭhā
122	<i>Saccharum officinarum</i> L (Poaceae) ^{10,15,18-21}	Ikṣu	Ikṣu
123	<i>Salix caprea</i> Linn (Salicaceae) ¹⁸	Vānirā Vetasa	
124	<i>Salmalia malabarica</i> (DC) Schott & Endl Syn <i>Bombax ceiba</i> Linn <i>Bombax malabaricum</i> DC <i>Gossampinus malabarica</i> (DC) Merr (Bombacaceae) ^{18,20,21}	Śālmali Mocarasa	Śālmali
125	<i>Salvadora oleoides</i> Dcne Syn <i>Salvadora persica</i> Linn (Salvadoraceae) ^{18,20,21}	Pīlu	Pīlu
126	<i>Santalum album</i> Linn (Santalaceae) ^{3,15,18-21}	Candana Bhadraśri	Śveta candana
127	<i>Saussurealappa</i> CBClarke (Asteraceae) ^{3,10,15,18,20,21}	Kuṣṭha	Kuṣṭha
128	<i>Scindapsus officinalis</i> Schott	Gajapīppalī	Gajapīppalī

	(Araceae) ^{3,15,18-21}		
129	<i>Semecarpus anacardium</i> Linn F (Anacardiaceae) ^{3,15,18,20,21}	Bhallātaka	Bhallātaka
130	<i>Sesamum indicum</i> Linn (Pedaliaceae) ^{15,18,20,21}	Tila	Tila
131	<i>Sidacordifolia</i> L (Malvaceae) ^{3,10,15,18}	Balā	
132	<i>Solanum indicum</i> L (Solanaceae) ^{3,18,20,21}	Bṛhatī	Bṛhatī
133	<i>Solanum surattense</i> Burm F Syn <i>Solanum xanthocarpum</i> Schrad & Wendl (Solanaceae) ^{10,19-21}	Kaṅṭakārī	Kaṅṭakārī
134	<i>Swertiachirata</i> (Roxb Ex Flem) Kar (Gentianaceae) ^{3,10,15,18,20,21}	Bhūnimba Kirātatikta	Kirātatikta
135	<i>Symplocos racemosa</i> Roxb <i>S paniculata</i> (Thunb) Miq (Symplocaceae) ^{3,10,15,18-21}	Lodhra	Lodhra
136	<i>Tecomella undulate</i> (G Don) seem Syn <i>Tecoma undulata</i> G <i>Bignonia undalata</i> Sm (Bignoniaceae) ^{3,18-21}	Rohitaka	Rohitaka
137	<i>Teramnus labialis</i> Spreng (Papilionaceae) ^{3,18,20,21}	Māṣaparnī	Māṣaparnī
138	<i>Terminalia arjuna</i> W & A (Combretaceae) ^{3,15,18-21}	Arjuna	Arjuna
139	<i>Terminalia belerica</i> Roxb (Combretaceae) ^{3,10,15,18-21}	Bibhītaka Triphalā©	Bibhītaka
140	<i>Terminalia chebula</i> Retz (Combretaceae) ^{3,10,15,18-21}	Harītakī Triphalā© Rohiṇī	Harītakī
141	<i>Terminalia tomentosa</i> W & A Syn <i>T alata</i> Heyne ex Rothe (Combretaceae) <i>Pterocarpus marsupium</i> Roxb (Papilionaceae) ¹⁸	Bijaka	
142	<i>Tinosporacordifolia</i> (Willd) Hook F & Thoms Syn <i>Menispermum cordifolium</i> Willd (Menispermaceae) ^{3,10,15,18-21}	Guḍūcī	Guḍūcī
143	<i>Trachyspermum ammi</i> (L) Sprague <i>T copticum</i> Link Syn <i>Carum copticum</i> Benth ex Hiern (Apiaceae) ^{3,18,20,21}	Yāvanī	Yāvanī

144	<i>Tragia involucrata</i> Linn (Euphorbiaceae) ^{18,20,21}	Vr̥ṣcikālī	Vr̥ṣcikālī
145	<i>Tribulus terrestris</i> L (Zygophyllaceae) ^{3,15,18-21}	Gok̥sura Gok̥suraka Daśamūla ®	Gok̥sura
146	<i>Trichosanthes dioica</i> Roxb (Cucurbitaceae) ^{10,15,18}	Paṭola	
147	<i>Trichosanthes bracteata</i> (Lam) Voigt (Cucurbitaceae) ^{3,18,20,21}	Viśālā	Viśālā
148	<i>Typha australis</i> Schum & Thonn Syn <i>T angustata</i> Bory & Chaub (Typhaceae) ^{3,15,18,20,21}	Gundrā	Gundrāh
149	<i>Uraria picta</i> Desv Syn <i>U logopodioides</i> DC (Fabaceae) ^{3,10,18-21}	Pṛśniparṇī	Pṛśniparṇī
150	<i>Valeriana wallichii</i> DC Syn <i>V jatamansi</i> Jones <i>Nardostachys jatamansi</i> (Jones) DC (Valerianaceae) ^{3,18}	Kālānūsārya Tagara	Tagara
151	<i>Vallisneria spiralis</i> Linn (Hydrocharitaceae) ¹⁸	Śaivāla	
152	<i>Vetiveria zizanioides</i> (Linn) Nash Syn <i>Andropogon muricatus</i> Retz <i>A squarrosus</i> Hook F (non LF) (Gramineae) ^{3,10,15,18,20,21}	Uśīra	Uśīra
153	<i>Viburnum nervosum</i> Hook F & Thoms Syn <i>V grandiflorum</i> Wall Ex DC (Caprifloriaceae) ¹⁸	Tilvaka	
154	<i>Vitex agnus-castus</i> Linn (Verbenaceae) ^{3,18}	Hareṇukā	
155	<i>Vitis vinifera</i> L (Vitaceae) ^{10,15,18-21}	Drākṣā Mrdwīkā	Drākṣā
156	<i>Withania ashwagandha</i> Kaul Syn <i>W somnifera</i> (Linn) Dunal (Solanaceae) ^{3,15,18-21}	Aśwagandhā	Aśwagandhā
157	<i>Woodfordia fruticosa</i> Kurz Syn <i>W floribunda</i> Salisb (Lythraceae) ^{3,15,18,19}	Dhātakī	
158	<i>Zingiber officinale</i> Roxb (Zingiberaceae) ^{10,15,18,20,21}	Śunthī	Śunthī
159	<i>Ziziphus jujube</i> Lamk Syn <i>Z mauritiana</i> Lamk Syn <i>Rhamnus jujube</i> L (Rhamnaceae) ^{10,18,20,21}	Kola Badarī	Kola

160	<i>Ziziphus nummularia</i> (Burm F) Wight & Arn <i>SynZ rotundifolia</i> Lam <i>Rhamnus nummularia</i> Burm f (Rhamnaceae) ¹⁸	Karkandhu	
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© *Triphala* is the group name given to 3 plant species (56,139,140 of the table)

® *Daśamūla* is formulation of ten roots

€ *Agastya Haritaki* is also a formulation of many plant species

∞ *Trigandha* is a group name given to 3 plant species (32,33& 53 of the table)

¥ *Trikatu* is a formulation of 3 Species (107, 108 &158 of the table)

Table 2: Survey Record of Āyurvedic Practitioners

Number of practitioners surveyed	Stage/Symptom of liver cirrhosis for which treatment given	Sanskrit names of plants used as drug(s)	Outcome
40	Dyspnoea, Dysentery	Kumari	Slow progress
	Splenomegaly	Kumari Arogyavardhini±	Progress observed within a year
	Abdominal pain, Loss in appetite	Kaṭukā Bhumiamalaki Dāruharidrā Pippalī	Progress observed within 6-8 months
	Hyperacidity Pain in right Hyperchondrium	Kaṭukā Kumari Punarnavā Kirātatikta	70%-80% cured
	Fever Vomiting	Śigru	Progress is slow but successful
	Ascites Hepatitis B	Kaṭukā Pippalī Bhumiamalaki	Progress observed within 3-4 months
	Loss of Appetite Liver Cirrhosis	Pippalī Dāruharidrā Āmalakī Bibhītaka Harītakī Kanchanar	Progress observed within 3-6 months
	Anorexia Weight loss	Kaṭukā Kumari Bhṛīṅgarāja Rohitaka Guḍūcī	Progress observed within 1 to 6 months

	Ascites Anaemia Abdominal pain	Kaṭukā Āmalakī Bhṛiṅgarāja Harītakī	80% cured
	Increased Abdominal girth (Advanced Liver cirrhosis stage)	Kaṭukā Arogyavardhini±	Slow progress and patients died

The information provided in the Table 2 is for about 121 numbers of patients handled by 40 Āyurvedic Doctors

± Arogyavardhini is a formulation of many herbs

DISCUSSION AND CONCLUSION

Charaka-Saṃhitā text in chapter 4, 13 & 16 on *Rakta-pitta*, *Udara-roga* and *Pāṇḍu-roga Cikitsā* contains 70 Sanskrit verses or set of verse lines describing the treatment and healing methods, the medicines to be prepared and administered All the plant names are described in Sanskrit either in simple words, compound words or synonyms Many a times, a common group name representing two or more individual plants (such as *Triphalā*, *Trikaṭu*, *Trigandha*, *Daśamūla*, *Ariṣṭa*, or *Pañcamūli*) have been prescribed, to which clarifications and references are been quoted from various authentic commentaries, medico-botanical glossaries and such parallel literature From the list (Table 1), it is also observed that a majority of plants (43%) belong to herbaceous habits and to the family Apiaceae, Fabaceae and Liliaceae and others are in the following order 30% are of Tree habit belong to family Moraceae, Anacardiaceae and so on; 26% are of Shrub habit belong to family Gramineae, Euphorbiaceae, Fabaceae; 7% are Climbers belong to family Piperaceae, Areaceae; 5% are Grass habit belonging to Gramineae Family and 5% of the plant species are belonging to IUCN Red List

The text mentions a total 195 Sanskrit named plants for the treatment of Liver Cirrhosis symptoms like Edema and Ascites, Jaundice, Variceal hemorrhage, Hepatic Encephalopathy, Splenomegaly, Shortness of breath, Kidney failure and Liver-cancer, etc (The plant list is mentioned in Column 3 of the above table) Many of the plant names were found to be synonyms of other Sanskrit names The official Sanskrit names as given by API/AFI (as Column 4 in the above table) were mentioned to avoid ambiguity Some Sanskrit names were not found in API/AFI Also by complete analysis of the study, it is revealed that these 195 Sanskrit named plants were actually 160 botanical plant species belonging to 70 angiosperm families The survey of Āyurvedic practitioners showed that 70 percent of these plants are used to treat the patients with Liver-Cirrhosis symptoms effectively

Liver-Cirrhosis as such is a complicated disease and this textual study will certainly benefit Āyurvedic medical practitioners and pharmaceutical companies in selection of proper plant species for drug formulation and biotechnological improvement of plant species, apart from endeavoring conservation of medicinal plants the data base also would add these findings to medicinal plant domain

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