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ORIGINAL ARTICLE

Ethnomedicines At Ahmednagar And Medicinal Plants In Mādhava Cikitsā Text For The Treatment Of Anaemia-Jaundice (~Pāndu Kāmalā)

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ABSTRACT
There are similarities in the herbal medicines, practiced by ethnic groups known as Ethno- medicines and by common people as Ayurvedic medicines in India. Both the traditions are time tested for their potentials. Mādhava Cikitsā is one of the important ancient Ayurvedic treatises but has been limitedly studied. It has described treatments for almost all known diseases in a very systematic order. So, the present study was undertaken to find out and enlist the plant names used in the Mādhava Cikitsā text in one hand and by ethnic groups (Tribal) at Ahmednagar district and of other tribal pockets /parts for the treatment of Pāndu Kāmalā (Anaemia-Jaundice) in the other hand for a comparison. The list of plant species described in the Mādhava Cikitsā text shows 61 Sanskrit plant names for the treatment of Anaemia-Jaundice. The careful analysis revealed that these 61 names were actually of 43 botanical plant species belonging to 30 Families. And the ethnomedicinal survey carried out from the study area also confirmed many of these names, although the names of the same plant species vary in the literature. The study is a first of its kind to educate herbal practitioners on the correct identification of plant species and their possible future sustainable use avoiding extinction and adulteration.
Key Words: Ethno-medicine, Mādhava Cikitsā, Pāndu Kāmalā, Anaemia –Jaundice

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INTRODUCTION

In countries such as India, China and many other parts of Asia one can observe traditional medical knowledge in two main forms such as codified medical systems and folk systems. In most countries where traditional medicine is not formalized, it largely remains in the non-codified folk knowledge form [1]. Ethnomedicine is one such folk knowledge deeply established in tribal pockets of India. The methods of doing ethomedicinal/ ethnobotanical research, relevant to medicinal plants are like archaeological search in literature, herbaria and field studies [2]. Ethno-botanical surveys have been carried out by many investigators for particular geographical areas or regions, particular tribes or specific diseases. Thus a lot of data on ethno-medicines is available. Ayurveda and Ethnomedicine are the Traditional systems, as like the differences between codified system (Ayurveda) and non-codified Folk medicine (Ethno medicine) system. The ethnomedicinal practice is based on empirical experiences and does not have a formal base. On the other hand, the Ayurvedic system is build on the empirical practices and strong conceptual foundations of human physiology as well as of pharmacology (though the tools of their investigations in those times were far different from the existing ones). The pharmaceutical processes have been more advanced today as against the use of crudely extracted juices and decoctions in ethnomedicinal practices. The Ayurvedic practices are well documented and widely institutionalized. On the other hand, the ethnomedicinal practices are localized and may be largely controlled by a few families in the ethnic communities. According to some authors, in terms of historicity, ethnomedicinal practices might be older than codified systems of medicine [3].

Mādhava Cikitsā, a treatise on principles of therapeutics, is one of the classical Āyurvedic treatises in Sanskrit. It is believed to be composed in Ca 7-8th century CE by Mādhava, popularly known as Mādhavāchārya or Mādhavakara [4]. The line of treatments specified in this text for diseases are mentioned in the same order as found in Mādhava Nidāna [4][5]. All availablemanuscripts of Mādhava Cikitsā are still unpublished and not studied [6].

Anaemia (also spelt as Anemia), ~Pāṇḍuroga / Pāṇḍu in Sanskrit, is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiological needs of the body. Jaundice, Kāmalā in Sanskrit, is a condition in which a person's skin and whites of the eyes are discolored viz., yellow, white or black due to an increased level of bile pigments in the blood resulting from liver diseases. Kāmala is the stage of proliferation of the untreated Pāṇḍu disease [7]. Mādhava Cikitsā in its chapter number Eight on Pāṇḍu Kāmala Cikitsā explains several preparations through 21 Sanskrit verses about treating this problem. The preparations/formulations described are exclusively meant to treat Pāṇḍu Kāmala. The formulations include Phalatrikadi Kwātha, Navāyasa Lauha, Ayastilādi Modaka , Ayorajādi Cūrṇa , Maṇḍūra Vajra Vataka , Tryuṣaṇādi Maṇḍūra, Drākṣāriṣṭa, Dhātryāriṣṭa, Kāmalāñjana, Nasya, Pathyādighṛta and Drākṣāghṛta. The present study is an attempt to critically analyze these verses, to enlist all the Sanskrit plant names, and to assign these plants to the most probable botanical identity through a detailed literature survey from various Ayurvedic and Botanical sources to reach out the objectives.

There appears a resemblance in disease diagnosis, medicinal plant collection, processing and formulation, dispensing of drug and treatment of disease between Ethnomedicinal tradition and Mādhava Cikitsā' tradition of Ayurveda. To establish relationship between the two medicinal practices on a more objective basis, further methodological studies need to be carried out.

MATERIALS AND METHODS

The literary studies are mostly focused to the Ethnomedicinal surveys that have been carried out in the sample area (Ahmednagar district) selected for the study. The information was searched for the ethnomedicinal uses of plants mentioned for the disease(s) that is under study. For some plants, information was not available from survey reports of Ahmednagar district. So, the screening work was extended further to the neighboring districts in the State of Maharashtra as well as to other states of India with the purpose of collecting the ethnomedicinal information for all those plant species enlisted in Mādhava Cikitsā text that are prescribed for the medicinal preparations to treat the disease of Pandurog /Kamala

Mādhava cikitsā text was carefully studied from its Sanskrit edition with Hindi commentary [8] and other public domain version [6]. The Chapter Eight on Pāndurog kamala chikitsā (treatment of Anaemia and jaundice) from Mādhava cikitsā text was studied with respect to derive all possible medicinal plants mentioned in the Sanskrit verses and a list of vernacular plant names was made.

The taxonomic/ botanical identification of all these medicinal plants described in Sanskrit in the text were carried out with the help of Sanskrit - English dictionaries [9][10], Nighantus [11] and commentaries on Âyurvedic texts[5][7][4][12][13],The Indian Materia Medicas [14][15],Glossaries of Indian medicinal plants [16,17,18,19,20,21,22,23] and Databases on Indian medicinal plants [24,25,26,27,28,29] that have done correlation work of Sanskrit plant names and botanical names. Further references and texts, including the official API (The Ayurvedic Pharmacopoeia Of India) [30] and AFI (The Ayurvedic Formulary Of India) [31] were also used.

The most probable botanical identification of each plant species was arrived at as per the maximum agreement of a name by the describer / authors (in the references) and also by adhering to the latest taxonomic principles of nomenclature of ICBN. The details of the study and identifications are presented in Table No. 1, arranged family-wise. The families in turn are sequenced according to the latest APG- III (Angiosperm Phylogeny Group - Third Version) system of classification (2009). Thus, the most primitive family considered here is Piperaceae that is placed first and the most advanced family is Convolvulaceae. Family Pinaceae is unclassified under APG system, since it belongs to Gymnosperms. So it is placed at the end of Table No. 1. Ethnomedicinal (EM) data is collected from literature and analysed to confirm use of different plant species from various families presented in Table No. 2. The families are sequenced again according to the latest APG- III system of classification. Thus, the most primitive family considered here as per the plants list is Liliaceae that is placed first and the most advanced family Apiaceae at the end.

RESULTS AND DISCUSSION

Table No. 1: Medicinal plants described in Mādhava Cikitsā for Pāṇḍu Kāmalā (Anaemia-Jaundice) Cikitsā

Sr. No.	Botanical Name (most probable) with plant authority	Sanskrit Name (s) as described in the Text in Devanāgarī	Sanskrit Name (s) as described in the Text in Roman diacritical forms
01	**Family- Piperaceae**		
	Piper chaba **Hunter** **Syn.** ***P. retrofractum*** **Vahl.** **Syn.** ***P. officinarum*** **DC [19,24, 25, 27,30, 31]$**	चव्य पंचकोल	***Cavya*** ***Pañcakolā***
	Ethno medicine: Not Available		
	Piper longum **L[19,21,24,25, 31]**	पिप्पली ग्रंथिका त्र्यूषंण कृष्णा पंचकोल व्योष	***Pippalī*** ***Granthikā*** ***Tryuṣaṇa*** ***Kṛṣṇa*** ***Pañcakolā*** ***Vyośa***
	Ethno medicine: Not Available		
	Piper nigrum **L.[14,17,19, 21,24,25,30,30,31]**	मरिच त्र्यूषंण व्योष	***Marica*** ***Tryuṣaṇa*** ***Vyośa***
	Ethno medicine: Not Available		
02	**Family- Lauraceae**		
	Cinnamomum zeylanicum **Blume** **Syn.*****C. verum*** **Presl.[17,19,24,26,28,29,30,31]**	त्वक त्वच	***Tvak*** ***Tvaca***
	Ethno medicine: Not Available		
03	**Family- Cyperaceae**		
	Cyperus rotundus **L. [10,14,19,21,22,23,24,25,26,27,28,29,30,31]**	मुस्ता	***Mustā***
	Ethno medicine: Available [33]		
04	**Family- Poaceae**		
	Hordeum vulgare **L.** **Syn.** ***H. hexastichon*** **L** **[14, 19,21,24,26, 27,28,29,30,31]**	यव	***Yava***
	Ethno medicine: Not Available		
	Oryza sativa **L.[19,21,24,26,31]**	शाली	***Śālī***
	Ethno medicine: Not Available		

	***Saccharum officinarum* L. [10,16,21,24,27,28]**	गुड़ शर्करा	***Guḍa Śarkarā***
	Ethno medicine: Available [33]		
	***Triticum aestivum* L.[14,19,24,27]**	गोधुम	***Godhuma***
	Ethno medicine: Not Available		
05	**Family- Zingiberaceae**		
	***Curcuma longa* L.** **[17,19,21,23,25,,27,28,,30,31]**	हरिद्रा निशा	***Haridrā*** ***Niśā***
	Ethno medicine: Available [34]		
	***Zingiber officinale* Roxb. [14,19,21,24,25,26,28,31]**	शुण्ठी व्योष नागर त्र्यूषंण पंचकोल	***Śunthī*** ***Vyośa*** ***Nāgara*** ***Tryuṣaṇa*** ***Pañcakolā***
	Ethno medicine: Available [34,35]		
06	**Family- Berberidaceae**		
	***Berberis aristata* DC. [14,19,21,24,25,26,28,30,31]**	दार्वी रसांजन	***Darvī*** ***Rasāñjana***
	Ethno medicine: Not Available		
07	**Family- Menispermaceae**		
	***Tinospora cordifolia* (Willd.) Hook F. & Thoms Syn. *Menispermum cordifolium* Willd.[10,14,17,19,21,23,24,25,26,,29,30,31]**	गुडुची अमृत	***Guḍūcī*** ***Amṛta***
	Ethno medicine: Available [32,35,36,37]		
08	**Family- Plumbaginaceae** ***Plumbago zeylanica* L.** **[10,14,17,19,21,23,25,26,28,30,31]** ***P. indica* L.** **Syn. *P.rosea* L.[19,20,24]**	चित्रक पंचकोल	***Citraka*** ***Pañcakolā***
	Ethno medicine: Available [33,38]		
09	**Family- Vitaceae**		
	***Vitis vinifera* L.[14,19,21,23,25,26,,29,30,31]**	द्राक्षा	***Drākṣā***
	Ethno medicine: Not Available		
10	**Family- Euphorbiaceae**		
	***Baliospermum montanum* Muell.Arg.[14,19,21,23,24,,25,28,30,31]**	दंती	***Daṇtī***
	Ethno medicine: Available [38]		
	***Emblica officinalis* Gaertn.** **Syn. *Phyllanthes emblica* L.** **[14,17,19,21,23,24,,26,,29,30,31]**	धात्री त्रिफला फलत्रिक	***Dhātrī*** ***Triphalā*** ***Phalatrika***

	Ethno medicine: Available [37]		
11	**Family- Cucurbitaceae**		
	***Luffa acutangula* (L.) Roxb.** **Var. *amara* (Roxb.) C.B.Clarke.[5,19,21,24,30,31]**	जाँगुल जालिनी	***Jaṅgula*** ***Jalinī***
	Ethno medicine: Available [33,37,39,42]		
12	**Family- Fabaceae**		
	***Cajanus cajan* (L.) Millsp.** **Syn.*C. indicus* Spreng[14,19,24,26,30,31]**	आढ़की	***Āḍhakī***
	Ethno medicine: Not Available		
	***Lens culinaris* Medic.** **Syn. *L.esculenta* Moench.[11,14,19,21,24,28]**	मसुर	***Masūra***
	Ethno medicine: Not Available		
	***Phaseolus mungo* L.[14,19,24,31]**	माष	***Māṣa***
	Ethno medicine: Not Available		
	***Phaseolus radiatus* L.** **Syn. *Vigna radiata* (L.) Wilczek[14,19,24,27,30,31]**	मुद्गा	***Mudga***
	Ethno medicine: Not Available		
13	**Family- Rhamnaceae**		
	***Ziziphus jujuba* Lamk.** **Syn. *Z. mauritiana* Lamk** **Syn. Rhamnus jujube L·[19,21,24,25,26,27,30,31]**	बदरी	***Badarī***
	Ethno medicine: Available [37]		
14	**Family- Combretaceae**		
	***Terminalia belerica* Roxb.** **[14,17,19,21,23,24,25,26,,28,30,31]**	बिभीतक त्रिफला फलत्रिक	***Bibhītaka*** ***Triphalā*** ***Phalatrika***
	Ethno medicine: Available[40]		
	***Terminalia chebula* Retz.[14,17,19,21,23,24,25,26,28,30,31]**	हरितकी अभया पथ्या त्रिफला फलत्रिक	***Harītakī*** ***Abhayā*** ***Pathyā*** ***Triphalā*** ***Phalatrika***
	Ethno medicine: Available [33,37]		
15	**Family- Malvaceae**		
	***Sida cordifolia* L.[14,17,21,23,24,24,26,31]**	बला	***Balā***
	Ethno medicine: Not Available		

16	**Family- Anacardiaceae**		
	***Pistacia chinensis* Bunge. Subsp. *integerrima* Stewart[14,21,24,26,30,31]**	कर्कट	***Karkaṭa***
	Ethno medicine: Not Available		
17	**Family- Burseraceae**		
	***Commiphora mukul* Engl.** **Syn. *C. wightii* (Arnot.) Bhandari** **Syn. *Balsamodendron mukul* Hook. Ex Stocks[14,21,24,26,28,30,31]**	गुग्गुल पलंकश	***Guggulu*** ***Palaṅkaśa***
	Ethno medicine: Not Available		
18	**Family- Meliaceae**		
	***Azadirachta indica* A. Juss.** **[14,21,23,24,25,26,28,30,31]**	निंब	***Nimba***
	Ethno medicine: Available [35,37]		
	***Melia azadirachta* L.[14,19,24,26,28]**	गैरिक	***Gairika***
	Ethno medicine: Not Available		
19	**Family- Rutaceae**		
	***Aegle marmelos* (L.) Correa Ex. Schultz[16,19,21,24,25,26,28]**	बिल्व शलाटु	***Bilva*** ***Śalatu***
	Ethno medicine: Available [33,37,42]		
20	**Family- Myrsinaceae**		
	***Embelia ribes* Burm.[14,23,24,25,26,,28,30,31]**	विडंग	***Viḍaṅga***
	Ethno medicine: Not Available		
21	**Family- Sapotaceae**		
	***Madhuca indica* J.F.Gmel [14,21,23,24,28,31]**	मधुक	***Madhūka***
	Ethno medicine: Not Available		
22	**Family- Symplocaceae**		
	***Symplocos racemosa* Roxb.[10,14,19,21,23,25,26,27,28,30,31]** ***S. paniculata* (Thunb) Miq.[19,20,24,26]**	लोध्र	***Lodhra***
	Ethno medicine: Not Available		
23	**Family- Gentianaceae**		
	***Swertia chirata* (Roxb. Ex. Flem.) Kar[14,19,21,24,25,,29.30,31]**	भूनिंब	***Bhūnimba***
	Ethno medicine: Not Available		

24	**Family- Rubiaceae**		
	***Rubia cordifolia* L.** **Syn. *R. manjista* Roxb.** **[14,17,19,21,23,24,25,26,,29,30,31]**	मंजिष्ठा	***Mañjiṣṭhā***
	Ethno medicine: Available [37,42]		
25	**Family- Acanthaceae**		
	***Adhatoda vasica* Nees.** **Syn.*Justicia adhatoda* L.** **Syn. *Adhatoda zeylanica* L.[14,19,20,21,23,,24,25,26,,28,29,30,31]**	वासा	***Vāsā***
	Ethno medicine: Jaundice: Available [32]		
26	**Family- Lamiaceae**		
	***Leonotis nepetaefolia* R. Br.[24,28,30,31]**	ग्रंथिका	***Granthikā***
	Ethno medicine: Not Available		
	***Leucas cephalotes* Spreng.[14,19,23,24,25,,30.31]**	द्रोणपुष्पी	***Droṇapuṣpī***
	Ethno medicine: Not Available		
27	**Family- Pedaliaceae**		
	***Sesamum indicum* L.** ***S. orientale* L.[14,19,24,25,28,29,30,31]**	तिल	***Tila***
	Ethno medicine: Not Available		
28	**Family- Scrophulariaceae**		
	***Picrorrhiza kurroa* Benth[14,19,21,22,24,25,31]**	कटूरोहिणी तिक्ता	***Katurohinī*** ***Tiktā***
	Ethno medicine: Available 41.		
29	**Family- Convolvulaceae**		
	***Operculina turpethum* (L.) Silva Manso** **Syn. *Ipomoea turpethum* R. Br.** **Syn.*Convolvulus turpethum* L.** **[14,19,20,21,24,25,30,31]**	त्रिभंडी	***Tribhaṇḍī***
	Ethno medicine: Not Available		
30	**Family- Pinaceae (Gymnosperm Family)**		
	***Cedrus deodara* (Roxb.) Loud.** **Syn. *C. libani* Barrel var. *deodara* Hook. F[19,21,24,25,29,31]**	देवदारू	***Devadāru***
	Ethno medicine: Not Available		

Table No. 2: Medicinal plants used as Ethnomedicine(EM)for Anaemia-Jaundice treatment/Cikitsā

Sr. No.	Family	Botanical Name	Local Name
1.	Liliaceae	*Asparagus racemosus* var. *javanica* Willd. [32,33]	Shatavar
2.	Hypoxidaceae	*Curculigo orchiodes* Gaertn. [32]	Kali musali
3.	Cyperaceae	*Cyperus rotundus* L.[32]	Nagar motha, Lavhala
4.	Poaceae	*Saccharum officinarum* L.[33]	Oos
		Desmostachys bipinnata (L.)DC.[32]	Kush
5.	Zingiberaceae	*Costus speciosus (Koen.) J* [37]	Piway, Peva.
		Zingiber officinale Rosc.[34,35]	Adrak
		Curcuma longa L. [34]	Halad
6.	Menispermaceae	*Cissampelos pareira* L.[42]	Pahad vel
		Tinospora cordifolia (Willd) Miers ex Hook. F. [32,35,36,37]	Gulvel
7.	Papaveraceae	*Argemone mexicana* L. [32,37,42]	Bilayat,Pivla Dhotra, Brahmdandi
8.	Caryophyllaceae	*Polycarpaea corymbosa* (L) Lamk.[42]	Dholiphuli
9.	Nyctaginaceae	*Boerhavia diffusa* L. [32,33,37,42]	Ghomati, Punarnava
10.	Plumbaginaceae	*Plumbago zeylanica* L. [32,37]	Chitrak
11.	Portulacaceae	*Portulaca oleracea* L.[32]	Gholachi bhaji
12.	Zygophyllaceae	*Tribulus terrestris* L.[32]	Sarata
13.	Oxalidaceae	*Oxalis corniculata* L.[32]	Changeri
14.	Euphorbiaceae	*Acalypha indica* L. [32,33]	Kokali, Jamalgota
		Baliospermum montanum Muell.Arg [38]	Danti
		Emblica officinalis Gaertn [37]	Avla
		Euphorbia nerifolia L.[33]	Sabar
		Euphorbia tirucalli L.[32]	Sher
		Jatropha curcas L. [32,33,35]	Mogali Erand, Parshi Erand
		Phyllanthus amarus Schum, & Thone.[32]	Hajar dani awala
		Phyllanthus niruri Hook f. Syn.*P. fraternus* Webster. [33,35,37]	Jondhali, Bhui awala
		Ricinus communis L. [32,33,37]	Erandi
15.	Cucurbitaceae	*Citrullus colocynthis L.*[32]	Kadu indrayan
		Coccinia grandis (L.) Voigt.[32]	Tondli
		Luffa acutengula (L.) Roxb, [33,37,39,42]	Ran-dodka
		Momordica charantia Linn.[35]	Karle
		Trichosanthes bicuspidata Lour.[33]	Padwal
16.	Fabaceae	*Abrus precatorius L.*[32]	Gunj
		Cassia fistula L. [32,42]	Bahava
		Cassia occcidentalis L.[32]	Rantakala, Takla, Tarwad
		Tamarindus indica L.[33]	Chinch
			Unhali

	***Tephrosia purpurea* (L.) Pers.[32,35,42]**	
17. **Moraceae**	***Ficus microcarpa* Linn. F.[33]**	**Nandruk**
	***Ficus hispida* L.f .[35]**	**Kala Umbar**
18. **Rhamnaceae**	***Ziziphus jujuba* Lamk [37]**	**Ber**
19. **Combretaceae**	***Terminalia belerica* Roxb [40]**	**Behda**
	***Terminalia chebula* Retz. [33,37]**	**Hirda**
20. **Lythraceae**	***Woodfordia fruticosa* (L.) Kurz.[32,37]**	**Dhayati**
	***Punica granatum* L. [33,35] (Former Family Punicaceae)**	**Dalimb**
21. **Malvaceae**	***Abutilon indicum* (L.) Sweet.[32]**	**Atibala, Mudra**
	***Sida acuta* Burm.f.[32]**	**Bala**
22. **Anacardiaceae**	***Mangifera indica* L.[42]**	**Amba**
23. **Meliaceae**	***Azadirachta indica* A.Juss. [35,37]**	**Kadulimb**
24. **Rutaceae**	***Aegle marmelos* (L.) Corr. [33,37,42]**	**Bel**
25. **Apocynaceae**	***Catharanthus pussilus* (L.) G.Don.[35]**	**Chandani**
	***Cryptolepis buchanani* Roem. Schult.[33,35]**	**Karanta**
Sub-family- Asclepiadoideae (Former Asclepiadaceae)	***Calotropis procera* (Ait.) R. Br.[32]**	**Pandhri Rui**
	***Gymnema sylvestre* (Retz.)R.Br.[32,35]**	**Gudhmar,Afumari, Bedki Vel**
	***Hemidesmus indicus* (L.) Schulte.[32,33,35,37]**	**Kavilicha vel**
	***Pergularia daemia* (Forsk.) Choiv.[32]**	**Utaran**
	***Tylophora dalzelli* Hook.[32]**	**Wata chira**
26. **Rubiaceae**	***Gardenia resinifera* Roth.[33]**	**Dikamali**
	***Rubia cordifolia* L.[37,42]**	**Manjishta**
27. **Acanthaceae**	***Hygrophila auriculata (Schmach.) Heine.* [35,37,42]**	**Talimkhana**
	***Justica adhatoda* L.[32]**	**Adulasa**
28. **Lamiaceae**	***Leucas aspera* (Roth) Spr.[32]**	**Dudhani**
	***Ocimum sanctum* L.[33]**	**Tulas**
	***Ocimum tenuiflorum* L.[32]**	**kali tulas**
29. **Scrophulariaceae**	***Picrorrhiza kurroa* Benth [41]**	**Kutki**
30. **Convolvulaceae**	***Evolvulus alsinoides* L.[32]**	**Vishnukant**
	***Ipomoea aquatica* Forssk.[32]**	**Nalachi bhaji**
31. **Solanaceae**	***Solanum anguivi* Lamk.[32]**	**Chinchurdi, Mothi Ringni**
	***Solanum nigrum* L. [32,35,42]**	**Kamoni, Kanguni**
32. **Asteraceae**	***Acanthospermum hispidum* DC.[32]**	**Germankata**
	***Eclipta alba* Hassak.33**	**Maka**
	***Sphaeranthus indicus* L. [35,37]**	**Gorakhmundi**
	***Tridax procumbens* L. [32]**	**Ekdandi**
33. **Apiaceae**	***Andrographis paniculata* Nees. *[*32,42]**	**Kalmegh, Oli Kirayat**
	***Anethum graveolens* L.[32]**	**Balant shepu**
	***Centella asiatica* (L.) Urb.[32]**	**Brahami**

FIG 1: Distribution of plant families

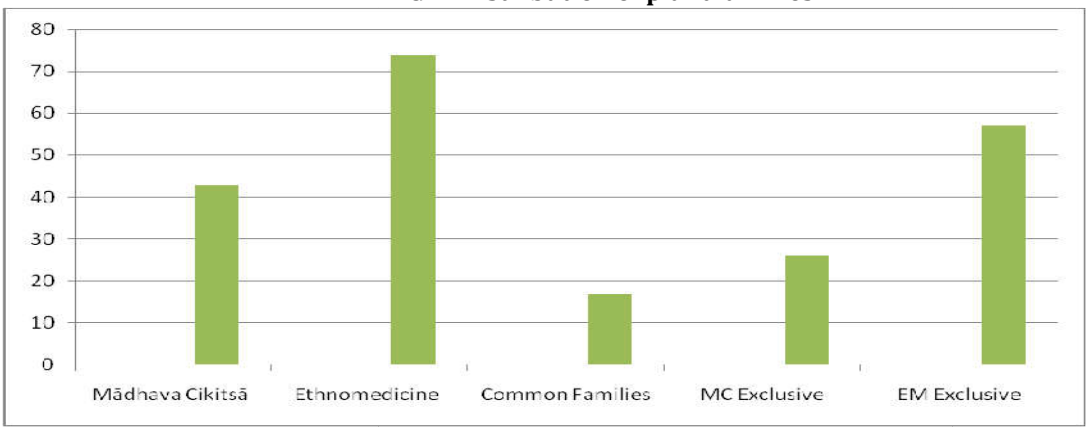
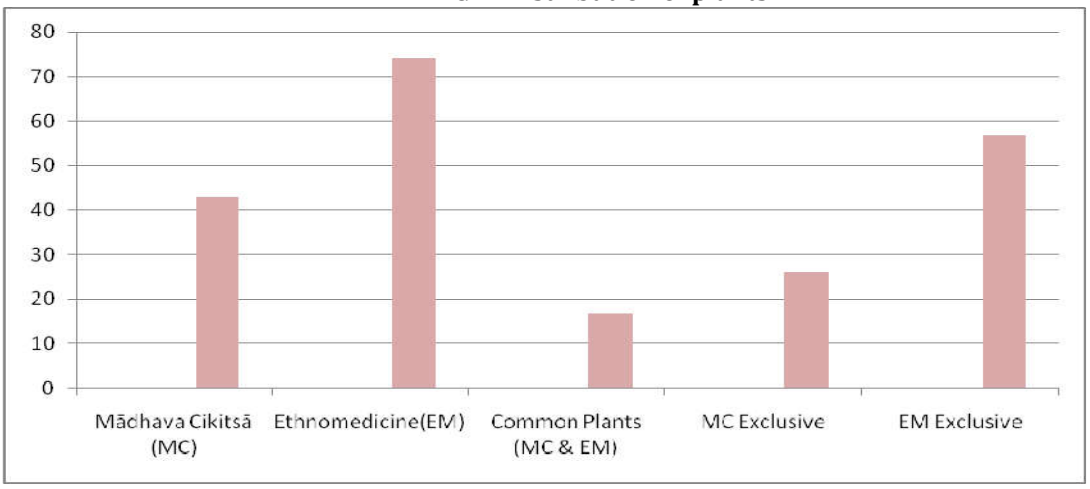


FIG 2 :Distribution of plants



CONCLUSION

Ethnomedicinal (EM) data as studied in this piece of work reveals that 74 plant species are distributed among 33 families while Mādhava Cikitsā text shows 43 botanical plant species belonging to 30 Families are used in the treatment of Anaemia and Jaundice. The 19 families are found to be common for both ethnomedicinal and ayurvedic medicinal plant data **(**MC & EM**)** such as Cyperaceae, Poaceae**,** Zingiberaceae**,** Menispermaceae**,** Plumbaginaceae**,** Euphorbiaceae**,** Cucurbitaceae**,** Fabaceae**,** Rhamnaceae, Combretaceae**,** Malvaceae**,** Anacardiaceae**,** Meliaceae**,** Rutaceae**,** Rubiaceae, Acanthaceae**,** Lamiaceae**,** Scrophulariaceae, Convolvulaceae.

The careful analysis found that (Table No. 3) out of total 30 families ascertained from Mādhava Cikitsā (MC) text, no plant species is recorded from 11 families (MC Exclusive) like Piperaceae, Lauraceae, Berberidaceae, Vitaceae, Burseraceae, Myrsinaceae, Sapotaceae, Symplocaceae**,** Gentianaceae**,** Pedaliaceae and Pinaceae to have ethnomedicinal data**.** Further, these families are found to be replaced by 14 other families in Ethnomedicinal data such as Liliaceae, Hypoxidaceae**,** Papaveraceae**,** Caryophyllaceae**,** Nyctaginaceae**,** Portulacaceae, Zygophyllaceae**,** Oxalidaceae**,** Moraceae**,** Lythraceae**,** Apocynaceae**,** Solanaceae**,** Asteraceae**,** Apiaceae (EM Exclusive).

The dominant families contributing more plants as medicines for the treatment of Anaemia and Jaundice as per this ethnomedicinal data are Euphorbiaceae with 09 species and Apocynaceae (including sub-family Asclepiadoideae) (07 species) followed by Cucurbitaceae and Fabaceae (05 species each). The rest of the families are represented by 04, 03, 02 or a single species each. And as per *Mādhava Cikitsā* the dominant families are Fabaceae and Poaceae (with 04 species each) and Piperaceae (with 03 species). The rest of the families are represented by 01 or 02 species each.

Over 100 plants are reported to be used in India for liver diseases[44]. Of the 74 ethnomedicinal plants analyzed (Table No. 4) in this study, 17 plants are already employed in MC. The remaining 26 plants out of 43 plants analysed from Madhava Cikitsa and 57 plants out of 74 plants used as ethnomedicine at Ahmednagar could provide new dimension to formulate useful drugs for liver disorders. So, 43 plant

species are the MC text medicines practiced in Ayurveda for Pandu kamala cikitsa whereas the common people in the remote areas / tribal areas use some additional plants along with about23% of text plants.
On comparison, it was observed that - i) both Ayuvedic system and Ethnomedicinal system use natural resources (mostly plants) as source of drugs; ii) there is hardly use of plants singly to treat a disease but use mixtures of different plants and iii) a plant is rarely found to be used for treating a particular disease only rather found to be used in the treatment of multiple diseases. It was also found that ethnomedicinal data is not available for 23 plants out of 43 screened plants of MC text. This may be due to non willingness of ethnic people to disclose the secrecy of knowledge held by them. Thus, there is need to create awareness among them by counselling on intellectual property rights, benefit sharing and rewarding their knowledge, etc. Another reason could be non availability of a particular species in the region.
It has been found that there is much similarity, in distant areas, with reference to the method of preparation, dosage and administration of folk medications using specific plant species for treating disease. This can be considered as criteria for considering the validity of the claims made by different ethnic groups. But it needs to be further confirmed by ethnopharmacological approach involving phytochemical analysis, pharmacognostic studies and supportive clinical data evidence.
"The authors have declared that no competing interest exists."

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