ARTICLE

Medicinal plants named *Amṛta* in Ayurvedic formulations

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Abstract

The Sanskrit word *amṛta* means immortality or ambrosia. In the *Ayurvedic Pharmacopoeia of India*, however, *amṛta* is defined as denoting specific medicinal plants that are commonly used in Ayurvedic formulations. The aim of this article is to examine the use of the word *amṛta* by comparing the components of formulations of *Amṛta Taila* in the *Nāvānītaka*, and the two kinds of *Amṛtādya Taila* in the *Caraka-saṃhitā*. The word *tila* means sesame (*Sesamum indicum* L. *Pedaliaceae*), and *taila* means sesame oil. In the two *Amṛtādya Taila*, *amṛta* is described as a component that treats various diseases caused by wind.

Figure 1. *Guḍūcī: Tinospora cordifolia (Willd.) Miers. (Source: By kind permission of Medicinal Plants Garden in NIPER)*

Introduction

In ancient Indian documents, the main senses of *amṛta* include 'immortality', 'immortality-giving drink', 'immortal food and drink taken by the gods', 'eternity', 'infinity', 'god', 'heaven', and 'paradise'.[1] It also has connotations of being 'imperishable', 'beautiful', 'agreeable', 'beautiful', and so on.[2] Immortality generally means living forever and is associated with mythological contexts.[3] In contrast, 'long life' means living a long life with a view of limited life and is associated with health care.[4] Linguistic studies have also reported that Greek *ἀμβροσία* and Sanskrit *amṛta*, although distantly related etymologically, may both have meant being immaterial, liberating death, and giving abundant life in the living world.[5] The word *amṛta* has other meanings that relate to medicines and preparations, such as juice, drug, formula, poison, antidote, water, milk, clarified butter, boiled rice, sweet, gold, mercury, ambrosia, and Dhanvantari as the physician of the gods.[6] In the ancient Indian scriptures of the *Ṛg-Veda* (hereinafter referred to as the ṚV), *soma*, the most important offering in the Veda ritual, is described as giving 'immortality', since drinking it cures disease and prolongs life.[7] In the ṚV, *soma* is equated with *amṛta*. Thus, in ancient India, the term *amṛta* was used both as a general term for ideas and their instantiations associated with 'immortality' and as a metaphor for their effects. Anything that could be construed to have an attribute of 'immortality' was called *amṛta*. However, in the *Ayurvedic Pharmacopoeia of India* (hereafter referred to as the API), *amṛta* is listed as a synonym of *Guḍūcī*: *Tinospora cordifolia* (Willd.) Miers. (*Menispermaceae*) and *Āmalaka*: *Emblica officinalis* Gaertn. (*Euphorbiaceae*) referred to specific medicinal plants.[8]

Figure 2. *Āmalaka: Emblica officinalis Gaertn. (Source: By kind permission of Medicinal Plants Garden in NIPER)*

In a previous study, the authors pointed out that an early example of the synonymity of *Guḍūcī* and *amṛta* evidenced in the API is found in the *Nighaṇṭu* (Ayurvedic drug lexicons) of *Bhāvaprakāśa*, and considered the possibility that the origin of *Guḍūcī* as a medicinal plant described there goes back to the story of the 'resurrection' of monkeys killed in battle in *Rāmāyaṇa*, one of the two important ancient Indian Sanskrit epics, which was associated with 'resuscitation' and 'immortality'.[9]

The authors deciphered the *Bower Manuscript*[10] (hereafter referred to as the *Bower* MS) in Sanskrit from a pharmacological point of view between 2009 and 2020. In the course of this work, the medicinal plants mentioned in the *Bower* MS were identified based on their active components and some of the documents

referenced in the API.[11] Their Sanskrit synonyms were also collected from these documents.[12] Based on the result, this article aims to analyse the use of *amṛta* as a medicine by comparing the components of three formulations: *Amṛta Taila* (hereafter referred to as AT) in the second part of the *Bower* MS and the two kinds of *Amṛtādya Taila* (hereafter referred to as ATT1 and ATT2) in the *Charaka-saṃhitā* (hereafter referred to as the CS) which contain *amṛta* in their names. In doing so, the present article focuses on *amṛta* as a medicine in the context of disease treatment in ancient India.

Figure 3. *Images of the relevant part of the Bower Manuscript (Source: By permission of The Bodleian Libraries, University of Oxford, MS. Sansk. c. 17 (P) 15r and 15v.) The description of Amṛta Taila is shown in red bracketed.*

The *Bower manuscript* and studies of the history of pharmacy

The *Bower* MS is a 51-leaf birch-bark manuscript purchased by Lieutenant Hamilton Bower (1858-1940) of the British Army in Kuqa, East Turkestan, in 1890.[13] Augustus Frederic Rudolf Hoernle (1841-1918), an authority on ancient texts at the time, deciphered the manuscript and found that it contained a collection of Ayurvedic formulations, divinations, and spells in the Gupta script.[14] Research into ancient scripts by Johann Georg Bühler (1837-1898), a leading philologist of ancient India, also revealed that the *Bower* MS was transcribed by four different authors between 350 and 375 AD (during the Gupta period).[15] The importance of this manuscript as a medium for the exchange of scientific knowledge between India and China has been highlighted, and it was the catalyst for the subsequent Silk Road and Western exploration trends.[16] The *Bower* MS is considered one of India's oldest medical texts because of its content relating to the origins of Ayurveda and its description of ancient Indian pharmacy. Although it is a valuable resource for the history of pharmacy, it has rarely been studied in the context of pharmaceutical research because it is not well known. Among the few studies, G.P. Srivastava (1916-1976) researched the *Bower* MS from the point of view of the history of Indian pharmacy.[17] Decades later, K.K. Bhutani (1956-2018) attempted to decipher the formulations of the *Bower* MS using a philological approach[18] with the aim of applying them to drug discovery and modern pharmacotherapy.[19]

The *Nāvanītaka* and the date of its establishment

The second part of the *Bower* MS is called the *Nāvanītaka*. It means fresh butter, or freshly pressed buttermilk in Sanskrit. As the most nutritious part of milk, the name reflects the recognition that the *Nāvanītaka* is the essence of ancient Indian medicine. Pharmacological events related to specific medicinal plants are described in formulations there.[20] Several theories have been put forward as to the establishment of the *Nāvanītaka*. The first theory was proposed by Hoernle and Gerrit Jan Meulenbeld (1928-2017), an authority on ayurvedic literature and a physician. On the basis of the citation relations between the texts, they state that the *Nāvanītaka* was composed at the same time as the pre-revision of the the CS.[21] Hoernle is of the opinion that the formulations collected in the *Nāvanītaka* are mainly based on the CS and the *Suśruta-saṃhitā* (hereafter abbreviated as the SS).[22] Meulenbeld, like Hoernle, dates its composition to the late third or early fourth century AD.[23] The second theory was presented by V.N. Pandey and A. Pandey, who conducted a chronological study respecting the mythological traditions of Ayurveda. They believe that the *Nāvanītaka* cited the original treatise of the CS, which is believed to have been established around the second century BC, and they place the establishment of the *Nāvanītaka* around the second century BC.[24] Both theories use the CS and the SS as indicators of the date of establishment of the *Nāvanītaka*. In addition to these two theories, bibliographer Lore Sander has analysed the script of the *Bower* MS and concluded that the first three parts were transcribed in the early to mid-sixth century AC.[25] As it is methodologically problematic to discuss the similarity of formulations solely on the basis of citation relationships without considering pharmacological contents,[26] this article only deals with the comparison of formulation components of ATT, ATT1, and ATT2.

Previous studies on AT in the *Nāvanītaka* include a work by M. Leonti and L. Casu who searched for me-

dicinal plants with stimulating properties in *soma*, a sacred wine used in Brahmanic rituals.[27] Following Hoernle's interpretation of medicinal plant names, they link the translation for *amṛta*, 'elixir of immortality', with the description of *soma* in the ṚV, and consider *amṛta* to be a synonym for *soma*, based on their view that AT in the *Nāvanītaka* was a formulation of *soma* in ancient India. The expression in the original commentary on the ṚV to which they refer, '*soma* that becomes immortal', suggests that they equate *soma* and *amṛta* as elements of a copulative compound. This expression can also be deciphered as an appositionally defined compound '*soma* like *amṛta*'.[28]

Amṛta in the *Caraka-saṃhitā*

The word *amṛta* appears in the three major ancient Indian medical texts (*bṛhattrayī*) as follows. The CS, Chapter 6 (*Cikitsāsathānam*), Theory of Remedies, Section 23, begins with the mythical origin of poison. There it is argued that *asura*, in conflict with the gods, churned the sea to obtain *amṛta*, the 'elixir of immortality'.[29] On the other hand, in the CS we find the terms *amṛta*, *amṛtā*,[30] *amṛtaphala* (fruit like *amṛta*),[31] *amṛtaka* (with *amṛta*),[32] *amṛtavallī* (*amṛta* with vine),[33] and *amṛtāsaṅga* (associated with *amṛta*).[34] Ram Karan Sharma (1927-2018) and Bhagwan Dash (1934-2015), who edited the CS notes, translated *amṛtaka* and *amṛtavallī* as *Guḍūcī*, interpreting *amṛtaphala* as *Āmalaka*, and *amṛtāsaṅga* as bitumen. They interpreted *amṛtāsaṅga* as eye wash or copper sulphate.[35] However, in the commentaries on medicinal plants in the three major ancient Indian medical texts, *Āmalaka* corresponds to *amṛtaphala* in the CS and bitumen to *amṛtāsaṅga*.[36] Thus, *amṛta* tended to be used not only in the sense of 'elixir of immortality' but also as a name for a specific medicine by virtue of its efficacy.

Figure 4. *Harītakī: Terminalia chebula Retz. (Source: By kind permission of Medicinal Plants Garden in NIPER)*

Amṛta in the *Suśruta-saṃhitā*

In the SS, *amṛta* is referred to as *amṛtā*,[37] *amṛtavallī*,[38] *amṛtādvaya* (the unique *amṛta*),[39] and *amṛtātuttha* (rock of *amṛta*).[40] The SS commentator Ḍalhaṇa translates *amṛtā* as *amṛtāsaṅga*, equating it with *amṛtātuttha* and using *amṛtā* to refer to copper sulphate.[41] Later publications on medicinal plants described in the SS also note that *amṛtā* and *amṛtādvaya* both mean *Guḍūcī* or *Harītakī*: *Terminalia chebula* Retz. (*Combretaceae*).[42] In modern times, K.R. Srikantha Murthy has translated *amṛtavallī* as a synonym for *Guḍūcī*.[43] Thus it can be seen that *amṛta* in the SS also tended to refer to specific medicines such as copper sulphate, *Guḍūcī,* and *Harītakī* by virtue of their efficacy. However, the uses of *amṛta* there do not clearly distinguish between *Guḍūcī* and *Harītakī*.

Amṛta in the *Aṣṭāṅgahṛdaya-saṃhitā*

The *Aṣṭāṅgahṛdaya-saṃhitā* (hereafter abbreviated as the AHS) describes *amṛtā*,[44] *amṛtavallī*,[45] *amṛtādvaya*,[46] *amṛtāsaṅga*,[47] and *amṛtātuttha*.[48] There are also references to *Guḍūcī*, so it is possible that *amṛta* and *amṛtā* referred to medicinal plants other than *Guḍūcī*. However, K.R. Srikantha Murthy interprets *amṛtavallī* as *Guḍūcī*, *amṛtādvaya* as *Guḍūcī* and *Harītakī*, and *amṛtāsaṅga* as bitumen. He uses two different nouns to translate *amṛtātuttha*, distinguishing *amṛtā*, a medicinal plant, and *tuttha*, which refers to sulphate. Thus, in the three ancient Indian medical texts, *amṛta* can be interpreted as *amṛtavallī* for *Guḍūcī* or *Harītakī*, as *amṛtāsaṅga* for bitumen, or as *amṛtātuttha* for copper sulphate.

Amṛta in the *Nāvanītaka*

The word *amṛta* occurs 21 times, once in the first part of the *Bower* MS and 20 times in the *Nāvanītaka*. Of these, *amṛta* is translated by Hoernle as an adjective meaning 'immortality' in 14 occurrences and as *Āmalaka*, *Guḍūcī* and *Harītakī* in 7 occurrences.[49] Among these, Chapter 11 of the *Nāvanītaka* contains a treatise called *Harītakī-kalpa*.[50] In this treatise, the creator-god Brahmā describes the origin of *Harītakī* as a drop that fell to the ground when Indra drank *amṛta*.[51] This statement shows a thoughtful attempt to link *Harītakī* as a medicinal plant with the idea of *amṛta* in Lord Indra's stirring of the milky ocean.[52] Thus *amṛta* can be used in the *Nāvanītaka* as an adjective or as another name for certain medicinal plants.[53]

Amṛta Taila: a formulation in the *Nāvanītaka*

Chapter 3 of the *Nāvanītaka* contains 20 oil formulations, and AT is the fourth one described in it.[54] In the three major ancient medical texts, there is no formula-

Table 1. *Review of amṛta in the three major medical texts and the Nāvanītaka*

Terms	Three major medical texts			Nāvanītaka
	CS	SS	AHS	
amṛta				○ (14)
amṛtā	H (14), ○ (5)	○ (17)	○ (45)	G (3), H (2)
amṛtaka	G (3)			
amṛtaphala	A (1)			A (2)
amṛtavallī	G (1)	G (2), ○ (1)	G (1)	
amṛtādvaya		G or H (1)	G or H (1)	
amṛtāsaṅga	bitumen (2)	copper sulfate (1)	bitumen (1)	
amṛtātuttha		copper sulfate (1)	copper sulfate (1)	

A : *Āmalaka* G : *Guḍūcī* H : *Harītakī* ○ : No corresponding drug specified
( ) : Number of examples

tion with the same name as AT. *Tila* means sesame (*Sesamum indicum* L. *Pedaliaceae*),[55] and *taila* means sesame oil in Sanskrit.[56] The description of AT is a monograph divided into two parts.[57] The first part begins with the formulation of AT, which is called the best *amṛta*, required by kings because it cures all diseases and is the oil that makes men strong. The formulation of AT began with the chanting of blessings to Brahman with auspicious prayers, incorporating aspects of the practice of formulation into religious rituals. This suggests that the formulation of AT may have had religious as well as therapeutic significance.[58] It describes 66 different raw materials, including metals and gemstones.[59] Among these, *Guḍūcī* is described as *amṛtā* in the feminine form.[60] The weighing units of the components listed in AT are larger than those used in the formulations listed in *the Ayurvedic Formulary of India*.[61]

Furthermore, it is practically difficult to assume that all these medicinal plants were collected for the purpose of preparing AT, as the timing and storage conditions in ancient times were different from those in modern times. However, as AT is prepared in three steps, it is possible that the final yield was lower due to the repeated boiling process. At the beginning of the second half of the description of AT, it is clearly stated that AT should be highly esteemed by gods. The methods of administration are oral, inhalation, injection into the anus or bladder, and application. It is described as applicable to 80 different diseases, long life, and health, but no names or descriptions are clearly given for these diseases and symptoms. At the end of the formulation, AT is redefined as the best elixir of immortality, which cures all diseases and is sought after by kings. The discussion of the formulation ends with the metaphor of an ancient sage *Mārkaṇḍeya* for 'immortality' through the use of AT.[62]

Table 2. *Formulation of Amṛta Taila in the Nāvanītaka*
The metric system of weights used in the Ayurvedic classics was adopted as approved by the Ayurvedic Pharmacopoeia Committee.

Verse	Context	Number of components	Sanskrit name	Name of plant and material	Family	Part used
	Tenth Leaf: Obverse					
287	Origin of *Amṛta Taila*					
288	Definition of *Amṛta Taila*					
289	Components of the formulation	1-1	*madhuka*	*Glycyrrhiza glabra* Linn.	*Leguminosae*	
290	Take 4 *pātra* each of the fresh juice of the following plants	2	*prapauṇḍarīka*	Unspecified		fragrant milk
		3-1	*amṛta*	*Tinospora cordifolia* (Willd.) Miers.	*Menispermaceae*	
		4-1	*viṣa*	*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*	tied roots
	Add 4 *pala* each of the following plants	5-1	*śatāvarī*	*Asparagas racemosus* Willd.	*Liliaceae*	
291		6	*śṛṅgāṭaka*	*Trapa bispinosa* Roxb.	*Onagraceae*	bark milk
		7	*āmaraka*	*Embilica officinalis* Gaertn.	*Euphorbiaceae*	bark milk
		8	*udumbara*	*Ficus racemosa* Linn.	*Moraceae*	bark milk
		9-1	*kaśeruka*	*Scirpus grossus* Linn. f.	*Cyperaceae*	bark milk
292		10	*kuśa*	*Desmostachya bipinnata* Stapf	*Poaceae*	root
		11	*kāśa*	*Saccharum spontaneum* Linn.	*Poaceae*	root
		12	*ikṣu*	*Saccharum officinarum* Linn.	*Poaceae*	root
		13	*śara*	*Saccharum munja* Roxb.	*Poaceae*	root
		14	*vīraṇa*	*Andropogon muricatus* Retz.	*Poaceae*	root
		15	*gundrā*	*Typha elephantina* Roxb.	*Typhaceae*	root
		16	*naḍikā*	*Pharagmetes karka* Retz.	*Poaceae*	root
		4-2	*kroñcānada*	*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*	root

Verse	Context	Number of components	Sanskrit name	Name of plant and material	Family	Part used
293		17	*vadarī*	*Ziziphus jujuba* Mill.	*Rhamnaceae*	
		18-1	*vidāri*	*Pueraria tuberosa* DC.	*Leguminosae*	
		19	*vetasa*	*Salix caprea* Linn.	*Salicaceae*	
		20	*aḍrūṣaka*	*Adhatoda vasica* Nees	*Acanthaceae*	
		21	*nimba* (*nīm*)	*Azadirachta indica* A. Jass.	*Mellaceae*	
		22	*sālmali*	*Bombax ceiba* Linn.	*Malvaceae*	
		23	*kharjūra*	*Phoenix dactylifera* Linn.	*Palmae*	
		24	*nālikera*	*Cocos nucifera* Linn.	*Palmae*	
		25-1	*priyaṅgu*	*Callicarpa macrophylla* Vahl.	*Lamiaceae*	
294		26	*paṭola*	*Trichosanthes dioica* Roxb.	*Cucurbitaceae*	
		27	*kuṭaja*	*Anogeissus acuminata* (Roxb. ex DC.) Guill. & Perr.	*Combretaceae*	
		28	*drākṣā*	*Vitis vinifera* Linn.	*Vitaceae*	
		4-3	*mṛṇāla*	*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*	leaf vein
		29-1	*candana*	*Santalum album* Linn.	*Santalaceae*	
		30	*kakubha*	*Terminalia arjina* W. & A.	*Combretaceae*	
		31	*aśvakarṇa*	*Dipterocarpus alatus* Roxb.	*Dipterocarpaceae*	
		32-1	*lāmajjaka*	*Vetiveria zizanioides* (Linn.) Nash	*Poaceae*	
		33	*dhanañjaka* (*citraka*)	*Plambago zeylanica* Linn.	*Plumbaginaceae*	
295	Boil them in 2 *droṇa* of water					
296a	Boil down the total amount to 1/8 and simmer with powder paste made from 1 *pala* each of the following drugs					
296b		34	*balā*	*Sida cordifolia* Linn.	*Malvaceae*	
		35	*nāgabalā*	*Sida veronicaefolia* Lam.	*Malvaceae*	
		36	*jīvā*	Unspecified		
		37	*ātmaguptā*	*Mucuna pruriens* DC.	*Leguminosae*	
		9-2	*kaśeruka*	*Scirpus grossus* Linn. f.	*Cyperaceae*	
297		38	*nata*	*Valeriana wallichi* DC.	*Valerianaceae*	
		39	*spṛkkā*	*Melilotus officinalis* Desf.	*Leguminosae*	
		40	*sūkṣmelā*	*Saccharum officinarum* Linn.	*Poaceae*	
		41	*tvak*	*Cinnamomum zeylanicum* Breyn.	*Lauraceae*	bark
		42	*jīvaka*	*Microstylis wallichi* Lindl., *M. musifera* Ridley.	*Orchidaceae*	
		43	*ṛṣabhaka*	Unspecified		
		44	*meda*	*Polygonatum verticillatum* All., *P. cirrifolium* Royle.	*Asparagaceae*	
		1-2	*madhuka*	*Glycyrrhiza glabra* Linn.	*Leguminosae*	
		45	*utpala*	*Nelumbo stellata* Willd.	*Nelumbonaceae*	
298		46	*kuṅkuma*	*Crocus sativus* Linn.	*Iridaceae*	
		47	*aguru*	*Aquilaria agallocha* Roxb.	*Thymelaeaceae*	
		48	*patra*	*Cinnamomum zeylanicum* Breyn.	*Lauraceae*	leaf
		18-2	*vidāri*	*Pueraria tuberosa* DC.	*Leguminosae*	
		49	*kṣīrakākolī*	*Roscoea species*., *Lilium polyphyllum* D. Don ex Royle	*Zingiberaceae* / *Liliaceae*	
		50	*vīrā*	*Uraria lagopodioides* (L.) Desv. ex DC.	*Leguminosae*	
		51	*śārivā*	*Hemidesmus indicus* R. Br.	*Apocynaceae*	
299		5-2	*śatāvarī*	*Asparagas racemosus* Willd.	*Liliaceae*	
		25-2	*priyaṅgu*	*Callicarpa macrophylla* Vahl.	*Varbenaceae*	
		3-2	*guḍūchi*	*Tinospora cordifolia* (Willd.) Miers.	*Menispermaceae*	
		4-4	*padmakesara*	*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*	stamens
		32-2	*lāmajjaka*	*Vetiveria zizanioides* (Linn.) Nash	*Poaceae*	
		29-2	*candana*	*Santalum album* Linn.	*Santalaceae*	
		52	*rājādana*	*Manilkara hexandra* (Roxb.) Dubard	*Sapotaceae*	

Verse	Context	Number of components	Sanskrit name	Name of plant and material	Family	Part used
300	8 ingredients that are not medicinal plants	53	*muktā*	pearl		
		54	*vidruma*	coral		
		55	*śaṃkha*	conch shell		
		56	*candrakānti*	moonstone		
		57	*endranīla*	sapphire		
		58	*sphaṭika*	crystal		
		59	*rajata*	silver		
		60	*hema*	gold		
301	Weigh 1 *pala* of the following 3 plants, grind and simmer gently over low heat	1-3	*madhuka*	*Glycyrrhiza glabra* Linn.	*Leguminosae*	
		61	*māñjiṣṭhā*	*Ventilago madraspatana* Gaertn.	*Rhamnaceae*	
		62	*aṃśumatī*	*Desmodium gangeticum* (L.) DC.	*Leguminosae*	
302	Boil 4 *pātra* of sesame oil and 8 times the amount of milk	63	*taila*	*Sesamum indicum* Linn.	*Pedaliaceae*	
		64	*payas*	milk		
		65	*āmbla*	sour fruit juice		
		66	*kāñcika*	rice vinegar		
303	Boil repeatedly 100 times or 1000 times					
304	Stir the oil after the appropriate time has elapsed, as it will harden due to exposure to sunlight					
	Brahman speaks blessings and is given the preparation to create happiness					
305	Evaluation of *Amṛta Taila*					
	Amṛta Taila is held in the highest esteem by God					
	Amṛta Taila is administered by injection, oral, inhalation or application to the bladder and anus					
	Tenth Leaf: Reverse					
306	Indications for *Amṛta Taila*					
	All diseases and strengthening of sensory organs					
	Best auspicious application against fever and thirst					
307	Growth and rejuvenation of children, female beauty and fertility					
308	Fertility, 80 nervous diseases, diseases due to derangement of the blood or the bile					
309	Diseases due to the phlegm or all the humours concurrently. Its inhalation or application enables the blind to see					
310	Removing misfortune and preventing disease					
	Promoting beauty. The great hermit *Cyavana* restores youth					
311	Avoiding rejuvenation, senility and disease, blessed by the holy *Mārkaṇḍeya* hermit who desired long life and good health					
312a	He will get what he wants					

1 *pātra*= 1 *āḍhaka*= 3kg. 57g 1 *droṇa*= 12kg. 228g 1 *pala*= 48g

***Amṛtādya Taila*: two kinds of formulations in the CS**

There were four formulations with the word *amṛta* in their names in the CS, none in the SS, and only one in the AHS.[63] Two of them had the same name, *Amṛtādya Taila*, meaning excellent oil-like *amṛta* and were oil-based formulations in the CS.[64] In the SS and the AHS, there are no oil formulations with the name *amṛta*. The components of these three formulations were compared

to determine their relevance to AT, ATT1, and ATT2. All of them use a medicinal plant called *amṛta*, which corresponds to *Tinospora cordifolia* (Willd.) Miers as a fixed alias of *Guḍūcī*. ATT1 and ATT2 do not contain any metals or gemstones in their components. In addition, there were 22 components that were common to ATT1 and ATT2 and 15 components that were common to AT, ATT1, and ATT2.[65]

Table 3. *Comparing the components of Amṛta Taila and two kinds of Amṛtādya Taila*

No.	Formulation	***Amṛta Taila***	***Amṛtādya Taila***		**Name of plant and material**	**Family**
	Reference	NN vv. 287-312a	CS 6. 28. 157½-164	CS 6. 29. 96-102		
	Component					
1	*aḍrūṣaka*	○			Unspecified	
2	*aguru*	○	○	○	*Aquilaria agallocha* Roxb.	*Thymelaeaceae*
3	*āmaraka*	○			*Embilica officinalis* Gaertn.	*Euphorbiaceae*
4	*āmbla*	○			sour fruit juice	
5	*amṛta* (*guḍūchi*)	○	○	○	*Tinospora cordifolia* (Willd.) Miers.	*Menispermaceae*
6	*aṃśumatī* (*śalaparṇī*)	○		○	*Desmodium gangeticum* (L.) DC.	*Leguminosae*
7	*aśvakarṇa*	○			*Dipterocarpus alatus* Roxb.	*Dipterocarpaceae*
8	*atibalā*		○		*Abutilon indicum* (Linn.) Sw.	*Malvaceae*
9	*ātmaguptā*	○			*Mucuna pruriens* DC.	*Leguminosae*
10	*balā*	○	○	○	*Sida cordifolia* Linn.	*Malvaceae*
11	*bālaka*		○		*Coleus vettiveroides* K. C. Jacob.	*Lamiaceae*
12	*bilva*			○	*Aegle marmelos* Corr.	*Rutaceae*
13	*bṛhatī* (*kaṇṭakārī*)			○	*Solonum indicum* Linn.	*Solanaceae*
14	*candana*	○	○	○	*Santalum album* Linn.	*Santalaceae*
15	*candrakānti*	○			moonstone	
16	*devadāru*		○		*Cedrus deodara* (Roxb.) Loud.	*Pinaceae*
17	*dhanañjaka* (*citraka*)	○			*Plambago zeylanica* Linn.	*Plumbaginaceae*
18	*drākṣā*	○			*Vitis vinifera* Linn.	*Vitaceae*
19	*elā*		○	○	*Elettaria cardamomum* Maton	*Zingiberaceae*
20	*endranīla*	○			sapphire	
21	*eraṇḍa*		○	○	*Ricinus communis* Linn.	*Euphorbiaceae*
22	*gokṣura*		○	○	*Tribulus terrestris* Linn.	*Zygophyllaceae*
23	*gundrā*	○			*Typha elephantina* Roxb.	*Typhaceae*
24	*hareṇu*		○		*Pisum sativum* Linn. *P. arvens* Linn.	*Leguminosae*
25	*hema*	○			gold	
26	*ikṣu*	○			*Saccharum officinarum* Linn.	*Poaceae*
27	*jīvā*	○	○	○	Unspecified	
28	*jīvaka*	○		○	*Microstylis wallichi* Lindl. *M. musifera* Ridley.	*Orchidaceae*
29	*jīvantī*		○		*Leptadenia reticulata* W. & A.	*Asclepiadaceae*
30	*kākolī*		○	○	Unspecified	
31	*kakubha*	○			*Terminalia arjina* W. & A.	*Combretaceae*
32	*kālā*		○		*Capparis zeylania* Linn.	*Capparaceae*
33	*kāñcika*	○			rice vinegar	
34	*kapikacchu*		○		*Mucuna prurens* DC.	*Leguminosae*
35	*karkaṭākhyā*		○		Unspecified	
36	*kāśa*	○			*Saccharum spontaneum* Linn.	*Poaceae*
37	*kaśeruka*	○			*Scirpus grossus* Linn. f.	*Cyperaceae*
38	*kāśmarī*			○	*Cedrela toona* Roxb.	*Meliaceae*
39	*keśara*			○	*Mesua ferrea* Linn.	*Guttiferae*
40	*kharjūra*	○			*Phoenix dactylifera* Linn.	*Palmae*
41	*kola*			○	*Ziziphus mauritiana* Linn.	*Rhamnaceae*
42	*kroñcānada*	○			*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*
43	*kṣīrakākolī*	○	○	○	*Lilium polyphyllum* D. Don	*Liliaceae*
44	*kulattha*			○	*Dolichos biflorus* Linn.	*Leguminosae*
45	*kuṅkuma*	○	○		*Crocus sativus* Linn.	*Iridaceae*
46	*kuśa*	○			*Desmostachya bipinnata* Stapf.	*Poaceae*

No.	Formulation	*Amṛta Taila*	*Amṛtādya Taila*		Name of plant and material	Family
	Reference	NN vv. 287-312a	CS 6. 28. 157½-164	CS 6. 29. 96-102		
	Component					
47	*kuṣṭha*		○	○	*Saussurea lappa* C. B. Clarke.	*Compositae*
48	*kuṭaja*	○			*Anogeissus acuminata* (Roxb. ex DC.) Guill. & Perr.	*Combretaceae*
49	*lāmajjaka* (*uśīra*)	○	○	○	*Vetiveria zizanioides* (Linn.) Nash	*Poaceae*
50	*madhuka* (*yaṣṭimadhūka*)	○	○	○	*Glycyrrhiza glabra* Linn.	*Leguminosae*
51	*mahāśrāvaṇī*		○		*Sphaeranthus africans* Linn.	*Asteraceae*
52	*māṃsī*		○		*Nardostachys jatamansi* DC.	*Valerianaceae*
53	*māñjiṣṭhā*	○	○	○	*Ventilago madraspatana* Gaertn.	*Rhamnaceae*
54	*māṣa*			○	*Vigna mungo* (Linn.) Hepper	*Leguminosae*
55	*māṣaparṇī*			○	Unspecified	
56	*meda* (*mahāmedā*)	○	○	○	*Polygonatum verticillatum* All., *P. cirrifolium* Royle.	*Asparagaceae*
84	*mṛṇāla*	○			*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*
57	*mudgaparṇī* (*sahā*)		○	○	Unspecified	
58	*muktā*	○			pearl	
59	*musta*		○		*Cuperus rotundus* Linn.	*Cyperaceae*
60	*naḍikā*	○			*Pharagmetes karka* Retz.	*Poaceae*
61	*nāgabalā*	○			*Sida veronicaefolia* Lam.	*Malvaceae*
62	*nakha*		○		Unspecified	
63	*nālikera*	○			*Cocos nucifera* Linn.	*Palmae*
64	*nata* (*tagara*)	○	○	○	*Valeriana wallichi* DC.	*Valerianaceae*
66	*nimba* (*nīm*)	○			*Azadirachta indica* A. Jass.	*Mellaceae*
67	*padmakesara*	○			*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*
68	*paṭola*	○			*Trichosanthes dioica* Roxb.	*Cucurbitaceae*
69	*patra*	○	○	○	*Cinnamomum zeylanicum* Breyn.	*Lauraceae*
70	*payas*	○	○	○	milk	
71	*prapauṇḍarīka*	○			Unspecified	
72	*priyaṅgu*	○			*Callicarpa macrophylla* Vahl.	*Lamiaceae*
73	*pṛśniparṇī*			○	*Uraria lagopoides* DC.	*Leguminosae*
74	*punarnavā*			○	*Boerhaavia diffusa* Linn.	*Nyctaginaceae*
75	*rājādana*	○			*Manilkara hexandra* (Roxb.) Dubard	*Sapotaceae*
76	*rajata*	○			silver	
77	*rāsnā*		○	○	*Pluchea lanceolata* Oliver, *Alpinia galanga* Willd.	*Asteraceae*
78	*ṛddhi*		○		Unspecified	
79	*ṛṣabhaka*	○	○	○	*Dienia muscifera* Lindl., *Microstylis muscifer*a (Lindl.) Ridl.	*Orchidaceae*
80	*sahācara*		○		Unspecified	
81	*śallakī*		○		*Boswallia serrata* Roxb.	*Burseraceae*
82	*sālmali*	○			*Bombax ceiba* Linn.	*Malvaceae*
83	*śaṃkha*	○			conch shell	
85	*śara*	○			*Saccharum munja* Roxb.	*Poaceae*
86	*śārivā*	○	○		*Hemidesmus indicus* R. Br.	*Apocynaceae*
87	*śatapuṣpā*		○		*Foeniculum vulgare* Mill.	*Apiaceae*
88	*śatāvarī*	○	○		*Asparagas racemosus* Willd.	*Liliaceae*
89	*sphaṭika*	○			crystal	
90	*spṛkkā*	○	○		*Melilotus officinalis* Desf.	*Leguminosae*
91	*śrāvaṇī*		○		*Sphaeranthus indicus* Linn.	*Asteraceae*
92	*śṛṅgāṭaka*	○			*Trapa bispinosa* Roxb.	*Onagraceae*
93	*sūkṣmelā*	○			*Saccharum officinarum* Linn.	*Poaceae*
94	*taila*	○	○	○	*Sesamum indicum* Linn.	*Pedaliaceae*
95	*tāmalakī*		○		*Phyllanthus niruri* Hook. f. non Linn.	*Euphorbiaceae*
96	*tvak*	○	○		*Cinnamomum zeylanicum* Breyn.	*Lauraceae*
97	*udumbara*	○			*Ficus racemosa* Linn.	*Moraceae*
98	*uśīra*		○		*Vativeria zizanioides* (Linn.) Nash	*Poaceae*

No.	Formulation	*Amṛta Taila*	*Amṛtādya Taila*		Name of plant and material	Family
	Reference	NN vv. 287-312a	CS 6. 28. 157½-164	CS 6. 29. 96-102		
	Component					
65	*utpala*	○			*Nelumbo stellata* Willd.	*Nelumbonaceae*
99	*vacā*		○		*Acorus calamus* Linn.	*Acoraceae*
100	*vadarī*	○	○		*Ziziphus jujuba* Mill.	*Rhamnaceae*
101	*vetasa*	○			*Salix caprea* Linn.	*Salicaceae*
102	*vidāri*	○			*Pueraria tuberosa* DC.	*Leguminosae*
103	*vidruma*	○			coral	
104	*vīrā*	○	○		*Uraria lagopodioides* (L.) Desv. ex DC.	*Leguminosae*
105	*vīraṇa*	○			*Andropogon muricatus* Retz.	*Poaceae*
106	*viṣa*	○			*Nelumbo nucifera* Gaertn.	*Nelumbonaceae*
107	*yava*			○	*Hordeum vulgare* Linn.	*Poaceae*
Total		69	49	35		

ATT1 is described in Chapter 28 on the treatment of diseases caused by wind (*vāta/vāyu*).[66] It restores the normal health of patients who have less potency, less digestive power, less strength, less intelligence and those who suffer from insanity, depression, and epilepsy. It is the foremost oil medication for curing those affected by wind-disease. In the meantime, ATT2 is expounded in Chapter 29 on the treatment of gout and arthritis. The descriptions of ATT1 and ATT2 are located in the part of the CS which is said to have been extended and completed by the Kashmiri physician Dṛḍhabala around the eighth to ninth centuries AD. This means that ATT1 and ATT2 may have been formed later than AT.[67] However, Hoernle believes that the origins of AT cannot be traced in the ancient Indian medical literature.[68]

ATT2 is used in the form of a potion for internal ingestion (*pāna*), massage, inhalation, and medical enema. It cures gout (*vāta-rakta*), phthisis, ailments caused by carrying heavy loads, sperm deficiency, tremors, convulsions, fractures, paralysis of the whole body or a part of it, ailments of female genital organs, epilepsy, insanity, lameness of hands and legs, and ailments caused during parturition.

Results

In the three major medical texts of ancient India, there are no verses in which *amṛta* is used as a synonym for a specific medicinal plant. However, in the *Nāvanītaka*, *amṛta* was used as another name for *Guḍūcī*, *Āmalaka*, and *Harītakī*. Of these, *Guḍūcī* tended to be identified with *amṛta*. *Amṛta* was one of the 15 common components in AT, AT1, and AT2. The methods of administration of AT are oral, inhalation, injection into the anus or bladder, and application. In ATT1, no description of the method of administration was found. On the other hand, ATT2 is used in the form of a potion for internal ingestion, massage, inhalation, and medical enema.

In AT, no names or descriptions are clearly given for applicable diseases and symptoms. The indications for ATT1 included gout, tuberculosis, sperm deficiency, tremors, convulsions, epilepsy, fractures, paralysis, diseases of female genitalia, mental disorders, and diseases caused by childbirth. Those for ATT2 were improvement of digestive function, mental disorders, depression, and convulsions, as well as gout and arthritis. No mention of *tridoṣa*, a fundamental principle of Ayurveda, is found in AT.[69] On the other hand, ATT1 and ATT2 were classified as formulations for the treatment of diseases caused by wind.

Conclusion

In ancient Indian pharmaceutical sciences, the fixed alternative name *amṛta* was used for certain medicinal plants such as *Guḍūcī*, *Āmalaka*, and *Harītakī*. Such examples are found in the *Nāvanītaka*. The medicinal properties of *amṛta* in ATT1 and ATT2 were not described as providing immortality, but the medicinal plants called *amṛta* are mentioned as components of formulations to treat various symptoms caused by wind. However, these medicinal plants do not just cure the symptoms caused by wind-diseases, but are also used for other therapeutic purposes. Similarly, the plants generically called *amṛta*, are not the only plants that can treat wind-diseases. The relationship between the medicinal properties of plants and their Sanskrit names remains a subject for future research.

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Homeopathy for their invaluable assistance. Professor Taiken Kyuma, Faculty of Humanities, Mie University, provided guidance in Sanskrit and Indology and made enthusiastic contributions to this work. The authors' appreciation also extends to the Weston Library Imaging Services Office, the University of Oxford, for the *Bower manuscript*. This research was funded by an International Society for History of Pharmacy Research Fellowship in 2014. The authors have no conflict of interest to declare.

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3. Brauce, L. Life out of death a structural analysis of the myth of the 'churning of the ocean of milk'. In Brill, EJ. *Studies in the history of religions supplements to numen XXXIII Hinduism new essays in the history of religions*. Leiden: Tuta sub aegide Pallas. 1978: 186-188. However, an analysis of the events associated with *amṛta* in mythology shows some distinguishing elements in the context of medicine.

4. Brauce, L. (Note 3) 1978: 181-182. J. Bruce Long (1937-2016), a scholar of the hermeneutics of Indian religion and mythology, argues that the term may be distantly related to the Greek term *ambrosia*. In Hindu mythology, the word 'immortality', which is the customary translation of *amṛta*, does not mean eternal life as it does in the Judeo-Christian tradition, but simply a long life filled with prosperity, health, many progenies, and general well-being.

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6. Apte, VS. *The practical Sanskrit-English dictionary, Revised and Enlarged Edition*. Kyoto: Rinsen Book Co., 2009: 204.

7. Müller, FM. (ed). *Rig-veda-samhitā*. *The sacred hymns of the Brāhmans together with the Commentary of Sāyanākārya*. Second Edition. Vol. I-IV Mandara X. Varanasi: Krishnadas Academy, 1983-1984: VIII (48)3; 10, 12.

8. Anonymous. *the Ayurvedic Pharmacopeia of India Part-I Vol. I-VI*. New Delhi: Ministry of Health and Family Welfare, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy. Government of India, 2011. *Part-I Vol. I* 53-55. *Vol. VIII* 1-2.

9. Natsume, Y. Amṛta as a vernacular name for medicinal plants in *The Ayurvedic Pharmacopeia of India*: its philological consideration. *The Japanese Journal for the Histosyry of Pharmacy*. 2020: 55(2); 136-151. *Bhāvaprakāśa* is a comprehensive book covering all important aspects of clinical practice and application in Ayurveda. Its establishment is placed in the 16th century AD, based on its detailed description of syphilis and its treatment. The description of *amṛta* in the API is related to the genealogy of ancient Indian mythological legends. This may be one of the reasons why the API uses *amṛta* as a synonym for certain medicinal plants.

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12. Names of plants may vary according to time and place, so a plant may not have one single name. Historical studies on primitive plants are not limited to literature and spectroscopy, but also include comparisons with modern plants based on chemical survey research. However, the correspondence between modern plants and those described in ancient literature can only be approximate. Ancient Indian botanical names written in Sanskrit have many synonyms, and they may differ depending on the literature. For these synonyms, this study has referred to those listed in the API. The interpretation of synonyms in the API was provided by Former Director Dr. Rajeev Kr. Sarma at Pharmacopoeial Laboratory for Indian Medicine.

13. See https://digital.bodleian.ox.ac.uk/objects/16fc31b7-1003-4658-9f6d-92aed688ef6b/.

14. Gupta script, any of a group of Indian alphabetic writing systems, was derived from a northern Indian alphabet of the 4th–6th century AD. The ruling Gupta state at that time gave the script its name. It was developed out of Brāhmī and was spread with the Gupta empire over large areas of conquered territory. See https://www.britannica.com/topic/Gupta-script.

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21. Hoernle, AFR. The composition of the Caraka Samhita in the light of the Bower Manuscript. *The Journal of the Royal Asiatic Society of Great Britain and Ireland*. 1909: 19; 879-881.

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31. CS (Note 29) 6. 7. 147.

32. CS (Note 29) 1. 14. 31.

33. CS (Note 29) 6. 1. 1. 77.

34. CS (Note 29) 6. 25. 117.

35. CS (Note 29) 1. 3. 10.

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45. AHS (Note 44) 6. 38. 18.

46. AHS (Note 44) 6. 39. 34.

47. AHS (Note 44) 4. 19. 67.

48. AHS (Note 44) 6. 26. 26.

49. *Guḍūcī*: the *Bower* MS (Note 10) vv. 139, 189, 290, 498; *Harītakī*: the *Bower* MS vv. 923, 924; *amṛtaphala*: the *Bower* MS v. 140.

50. *Bower* MS (Note 10) vv. 917-942.

51. *Bower* MS (Note 10) v. 922.

52. Natsume, Y. (Note 9) 2020: 143.

53. *Bower* MS (Note 10) v. 923 In the *Harītakī-kalpa*, *amṛta* is mentioned as one of the names of the seven morphologically classified species of *Harītakī*. As its shape recalls *amṛta* drops, *amṛta* here can be taken as a figurative adjective for the appearance and medicinal properties of *Harītakī*. In the *Śilājatu-kalpa*, the *Bower* MS 951-967a deals with the treatment of the human body with bitumen. Bitumen is described as *śilāja* and no mention of *amṛta* is found.

54. *Bower* MS (Note 10) vv. 287-312a

55. Monier, MW. (Note 1) 2006: 448. This plant is supposed to have originated from Viṣṇu's sweat-drops.

56. Monier, MW. (Note 1) 2006: 455. Sesamum oil.

57. The first part is from verses 287 to 305, and the second part is from verses 306 to 312a.

58. Leonti, M. and Casu, L. (Note 26) 2014: 375. This study points out that medicinal plants used for AT include those that produce psychoactive secondary metabolites.

59. Hoernle, AFR. (Note 10) 1893-1912: Part 2. 106. footnote 118. Although Hoernle states that 40 components are named in the first part and 43 in the second part, the present research counts a total of 66 species, treating synonyms as referring to one medicine.

60. *Āmalaka* in AT is not described as *amṛtā* or *amṛtaphalā*. Therefore, it can be inferred that *amṛta* and *Guḍūcī* are synonymous.

61. Anonymous. *The Ayurvedic Formulary of India*. 2 ed, Part I-III. New Delhi: Ministry of Health and Family Welfare, Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy. Government of India, 2003-2011.

62. Monier, MW. (Note 1) 2006: 612. The sage who is credited with authoring the *Mārkaṇḍeya prāṇa*. He became immortal through extreme penance. He is also called Dīrghāyus, the man of longevity.

63. CS (Note 29) 6. 41. 3, 6. 243. 4, 6. 28. 157½, 6. 29. 103 SS 5. 10. 13, 5. 18. 44-47 (*amṛta* is mentioned as a component) AHS 4. 3 . 94b (The name of the formulation is *Amṛtaprāśa Ghṛta* and there is no mention of *amṛta* among the components).

64. CS (Note 29) 6. 28. 157½-164, CS 6. 29. 103-109.

65. Formulations of ATT1 and AT shared 22 components. On the other hand, ATT2 and AT shared 17.

66. The five elements (*bhūta*) - earth (*pṛthivī*), water (*ap*), fire (*tejas*), wind (*vāyu*), and space (*ākāśa*) - are combined in the body in two parts, each to form the three elements - bile (*pitta*), wind (*vāyu*), and phlegm (*kapha*).

67. Meulenbeld, GJ. *A History of Indian Medical Literature*. Groningen oriental studies IA. Groningen: Egbert Forsten, 1999: 106-110. In the ancient Indian medical tradition, Agniveśa was one of the six disciples of Ātreya and first compiled Ātreya's teachings into the *Agniveśa-tantra*. This is the basis of the CS; Caraka is said to have inherited medicine by compiling the *Agniveśa-tantra*. Tradition has it that the Kashmiri physician Dṛḍhabala completed the CS around the 8th-9th century, writing the last 17 chapters of the sixth volume and the entire seventh and eighth volumes. Thus, in dating the formation of the CS, it should be noted that the *Agniveśa-tantra* and both the revised and the extant completed versions of the Charaka belong to different periods.

68. Hoernle, AFR. (Note 10) 1893-1912: 106.

69. Rathor, S. Mishra, RK. and Sharma, HL. Significance of Riddhi (Habenaria Intermedia D. Wear) in Ayurveda: a classical review based on various ancient ayurvedic treatise. *Indian Journal of Ancient Medicine and Yoga*. 2020: 13(2); 63-74. See https://dx.doi.org/10.21088/ijamy.0974.6986.13220.1. *Vātavyādhi* means diseases caused by wind (*vāta*), one of the three humors (*tridoṣa*) in Ayurveda.