Journal of Ayurveda & Holistic Medicine

www.jahm.co.in

eISSN-2321-1563

REVIEW ARTICLE **OPEN ACCESS**

AMLA PREPARATIONS WITH SPECIAL REFERENCE TO CLASSICAL TEXT RASATARANGINI

RAMYA M. PAVATE[1] VINAYKUMAR R. KADIBAGIL[2] GAZALA HUSSAIN[3] MANASWINI K R[4] PRAKRUTHI T S[5] SANDEEP Y[6]

ABSTRACT

Rasashastra is a branch of *Ayurveda* where the knowledge of metals, minerals and marine sources for the use in therapeutics is emphasized. It also gives information about its use in *deha* and *loha vada.* In classics, much of the importance has been given to *kshara* (alkaline) preparations than *amla* (acidic). The recent book on *rasashatra* by Sri Sadanand Sharma sir have focussed even on *amla* preparations with its therapeutic utility. Hence an effort is made to collect all the data on acidic preparations explained in *rasatarangini* book. There are 10 acidic preparations found which have therapeutic utility and research updates on it have put light of on its usage in various disorders in contemporary science too.

Keywords: *lavana, drava, amla,* acids, bases

[1*]3rd year PG Scholar, [2]Professor, [3]Associate Professor, [4]1st year PG Scholar Department of Rasashastra and Bhaishajya Kalpana, Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital, Hassan, INDIA

Corresponding Email id: ramyapavate@gmail.com Access this article online: www.jahm.co.in

INTRODUCTION:

Rasashastra is a science of study of metals, minerals and marine sources. It includes *loha vada* which is conversion of lower metal to higher and *deha vada* for the treatment of disease. *Rasatarangini* is a recent book on *rasashastra* written by acharya shri sadanand sharma where the *rasa dravya* (drugs of mineral origin) are classified into groups mostly based on their utility in *paradadi karma* (processing of mercury) and similarities in property. One can also find the references of acids and alkalis mentioned for both pharmaceutical and therapeutic purpose. As it is a book of 19th century A.D, the preparations are being corelated to scientific terminologies of chemistry.

MATERIAL AND METHODS:

Thorough search of classical book *rasatarangini* was done to collect the information about all the *amla* (acid) preparations explained.

OBSERVATIONS AND RESULTS:

Table 1: List of acids with chemical formula

Sl. no.	*Amla dravya* (acids)	Chemical formula	Reference
1	*Nimbukamla* (citric acid) [1]	$C_6H_8O_7$	Rasatarangini 6/90-95
2	*Gandhakamla* (sulphuric acid) [2]	H_2SO_4	Rasatarangini 8/113-133
3	*Tankanamla* (boric acid) [3]	H_3BO_3	Rasatarangini 13/100-111
4	*Soraka drava* (nitric acid) [4]	HNO_3	Rasatarangini 14/47-58
5	*Lavanamla* (hydrochloric acid) [5]	HCl	Rasatarangini 14/165-184
6	*Swarna lavana* (gold chloride) [6]	$AuCl_3$	Rasatarangini 15/34-44
7	*Sorakamleeya rajata* (silver nitrate) [7]	$AgNO_3$	Rasatarangini 16/76-100
8	*Gandhakamleeya yashada* (zinc sulphate) [8]	ZnS	Rasatarangini 19/149-166

Table 2: List of bases prepared from acid with chemical formula

Sl. no.	*Kshara dravya* (alkalis)	Chemical formula	Reference
1	*Nimbukamleeya yavakshara*	$K_3C_6H_5O_7$	Rasatarangini 13/33-41

	(tripotassium citrate) [9]		
2	*Nimbukamleeya sarjikakshara* (sodium citrate) [10]	$Na_3C_6H_5O_7$	Rasatarangini 13/58-71

Method of preparation:

1] *Nimbukamla*: Fresh *nimbukadi phala* (citrus fruits) are to be collected and *swarasa* (juice) has to be extracted into *kachalipta mrut patra* (molten glass) by filtering. This has to be boiled over mild fire in the same vessel. Later it has to be taken off the fire and added with *katika churna* (chalk powder) until the vapours disappears. Then *gandhakalma* (sulphuric acid) has to be added little by little until the white *katika* settles down at the bottom. Later this mixture has to be filtered through clean thin cloth and the liquid portion is heated until solid white powder remains at the bottom of the vessel. This powder is known as *nimbukamla*.

2] *Gandhakamla*: 100 *pala* (4800 gms) of *shuddha gandhaka* (pure sulphur) and 2.5 *tola* (30 gms) of *soraka* (potassium nitrate) are to be taken in a separate *lohapatra* (iron vessel). 210 *pala* of *jala* (water) has to be taken into another glass jar. Each of these have to be closed and fitted with a separate pipe which connects to the reciever glass jar. 1st 3 vessels have to be kept on fire and heated. The fumes from *gandhaka* and *soraka* mixes with vapours of water in the pipe and collects in the receiver jar. When 300 *pala* of distillate is obtained, the heating is stopped and this yellow coloured liquid is stored as *gandhakamla*.

This has to be purified by boiling the liquid to 1/3rd. This process removes the excess water and *naga dosha* (impurities like lead) if present any.

3] *Tankanamla*: 1-part *shuddha tankana* (pure borax) is to be taken in a glass jar and added with ½ part of hot water. This has to be heated on fire and added with *lavana dravaka* (hydrochloric acid) drop by drop until *tankana* settles at the bottom. Later it has to be cooled and filtered to separate the *tankanamla*. This *tankanamla* has to be added with 3 parts hot water and dissolved. It has to be again filtered and solid *tankanamla* is collected. This has to be dried and used for further process.

4] *Soraka drava*: 1-part *shuddha soraka* and ½ part *gandhakamla* are to be taken in a glass/ still. One end of the glass pipe has to be attached to this still and the other end has to be attached to the receiver glass kept inside water. Mild heat should be given to still by which it melts, vaporizes and condenses into

receiver glass. This liquid is known as *soraka drava*.

5] *Lavana dravaka*: The required quantity of *saindhava lavana* [NaCl] has to be done *bharjana* [frying] until water portion evaporates. 6 parts of this *saindhava lavana* has to be filled in *kacha kupi* and added with 11 parts of *gandhaka dravaka* [H_2SO_4] slowly. This *kupi* has to be attached with one end of the pipe. Connect the other end of pipe to another *kupi* kept inside half-filled cold-water vessel. This *kupi* has to be bigger than first. Give *manda agni* [low flame] by which the content in the 1st *kupi* heats and vaporises. The vapours are cooled by cold water and get collected in 2nd *kupi*.[33] This can be compared to distillation process in modern technique, which yields colourless, transparent, odourless and sharp liquid as distillate which is called *lavana dravaka.*

6] *Swarna lavana*: 3 parts of *shodhita Swarna churna* [pure gold powder] has to be taken in a glass / still and heated on mild fire. This has to be added slowly with the mixture of *lavanamla* (hydrochloric acid) and *sorakamla* (nitric acid) in the ratio 4:1 by which the gold dissolves. Later this has to be added with 10 parts of *saindhava lavana* and heated until all the liquid portion evaporates. The *narangi varna* (orange colour) powder left at the bottom is known as *Swarna lavana*.

7] *Sorakamleeya rajata*: A glass beaker has to be taken and added with pieces/ powder of *rajata patra* [silver foils]. To this, *sorakamla* has to be added slowly until *rajata* dissolves completely. While adding acid, there will be strong white fumes emerging out of it. So, one has to cover their face to avoid inhalation. The mixture should be white in colour, if not, the blue colour indicates the presence of copper as impurity in it. This white mixture has to be treated with *lavana dravaka* slowly until all the *rajata* settles at the bottom as curd. This has to be filtered through filter paper and the filtrate has to tested for presence of copper (in *rajata* sediment) using *navasadara bhaspa drava* (liquid ammonia). The curd like *rajata* has to be washed and filtered with fresh water several times until it loses copper content it. The obtained copper free *rajata* has to be added with little quantity of *yashada* and kept for 7-8 days to get *bhasma* (ash) like *rajata churna* at the bottom of the beaker. This sediment has to be washed with water until the filtrate is devoid of white colour indicating absence of acid. This acid free *rajata* has to be taken in a beaker, added with little quantity *sorakamla* and heated mildly until the liquid portion evaporates. The powder settled at the bottom known as *sorakamleeya rajata* has to be collected and stored in a blue coloured glass bottle.

8] *Gandhakamleeya yashada*: *Shuddha yashada churna* [pure zinc powder] has to be taken in a beaker and added with *gandhakamla* slowly. Once the *yashada* dissolves completely, this mixture has to filtered through filter paper. The filtrate obtained has to be heated on mild fire until liquid evaporates. When the content is just wet, has to be taken off the fire and allowed for self-cooling. The white coloured powder settled at the bottom of the beaker is known as *gandhakamleeya yashada.*

9] *Nimbukamleeya yavakshara*: 24 parts of *yavakshara* [potassium carbonate] taken in a glass jar is added with equal parts of *jala* and mixed well. Meanwhile 20 parts of *nimbukamla* is added with equal parts of *jala* and mixed thoroughly in a glass vessel. These two should be mixed together and heated until liquid portion evaporates. The solid *karpura varna* (white colour) powder settled at the bottom of the vessel is known as *nimbukamleeya yavakshara*.

10] *Nimbukamleeya sarjakshara*: 41 parts of *sarjakshara* [sodium bicarbonate] taken in a glass jar is added with double quantity of water and mixed well. In another glass vessel 20 parts of *nimbukamla* is added with equal parts of water and mixed thoroughly. These two have to be mixed together and heated until liquid portion evaporates. The solid *shubra varna* (white colour) powder settled at the bottom of the vessel is known as *nimbukamleeya sarjakshara*.

Table 3: Properties, dose and indications of acids and bases

Sl. no.	*Amla* (Acids)	*Guna-karma* (Properties)	*Matra* (Dose)	*Rogaghnata* (Indication)
1	*Nimbukamla* (citric acid)	-	-	-
2	*Gandhakamla* (sulphuric acid)	*Ushna veerya* (hot potency), *agni deepaka* (improves digestive fire)	5-20 drops (diluted)	*Gulma* (tumor), *pleeha* (splenomegaly), *krimi* (worm infestation), *sarva udara* (diseases of abdomen), *visuchika* (cholera), *adhmana* (abdominal bloating), *jwara* (fever), *rakta atisara* (dysentery), *tusha* (thirst), *atisara* (diarrhoea),

				timira (blindness)
3	*Tankanamla* (boric acid)	*Bhutaghna* (protects from evil eye), mutrala (diuretic), *kshata rohaka* (wound healer)	2-8 *ratti* (250-1000 mg)	*Netrabhishyanda* (conjunctivitis), *agni dagdha vrana* (burn), *shweta pradara* (white discharge), *karna srava* (discharge from ear)
4	*Soraka drava* (nitric acid)	*Ushna veerya* (hot potency- conc.), *vrana shodhana* (cleanses wound), *vrana ropana* (wound healer), *balya* (strengthens body)	5-30 drops (diluted)	*Jangama visha* (animate poisoning), *madhumeha* (diabetes), *pleeha* (splenomegaly), *upadamsha* (syphilis), *kamala* (jaundice), *pandu* (anaemia), *atisara* (diarrhoea)
5	*Lavanamla* (hydrochloric acid)	*Teekshna* (penetrating), *agni deepaka* (improves digestive fire), *balya* (strengthens body)	5-16 drops (diluted)	*Mutra dosha* (diseases of urinary system), *yakrut dosha* (diseases of liver), *ajirna* (indigestion), *kshara meha* (alkaline urine), *antrika jwara* (typhoid fever)
6	*Swarna lavana* (gold chloride)	Vrusya (aphrodisiac), tridoshahara (balances the three dosha), *madhura-tikta rasa* (sweet-bitter taste), *salile dravi bhavet* (dissolves in water)	1/50-1/20 *ratti* (2.5-6.25 mg)	*Pushpavarodha* (menstrual disorder), *madhumeha* (diabetes), *phiranga* (gonorrhoea), *apasmara* (epilepsy), *shwasa* (dyspnoea), *unmada* (psychosis)

7	*Sorakamleeya rajata* (silver nitrate)	-	2-3 drops (diluted)	*Netrabhishyanda* (conjunctivitis), *netra pothaki* (trachoma), *visarpa* (herpes zoster), *vrana meha* (diabetic wound), *kshata* (wound), *Shweta pradara* (leucorrhoea)
8	*Gandhakamleeya yashada* (zinc sulphate)	*Pooya-sravaghna* (dries up the pus and secretion), *sankochaka* (contraction)	-	*Netrabhishyanda* (conjunctivitis), *vrana meha* (diabetic wound), *Shweta pradara* (leucorrhoea)
9	*Nimbukamleeya yavakshara* (tripotassium citrate)	*Mutrala* (diuretic), sleshma bhedaka (liquifies sputum), *sweda janaka* (induces sweating)	5-10 *gunja* (625-1250 mg)	*Jwara* (fever), *jalodara* (ascites), *vrukka shotha* (hydronephrosis), *vrukka shoola* (pain in renal region), *mutra rodha* (dysuria), *slaishmika kasa* (productive cough)
10	*Nimbukamleeya sarjikakshara* (sodium citrate)	*Kantikara* (lustre), grahi (absorbant), sheeta (cold to touch), *dugdha pachana* (digests milk)	1-2 *ratti* (125-250 mg in children) 5-10 *ratti* (625-1250 mg in adult)	*Chardi* (vomiting), *adhmana* (abdominal bloating), *shoola* (pain), *vistambha* (constipation), *pipasa* (thirst), *atisara* (diarrhoea),

DISCUSSION:

Since ancient times, one can observe that much of the importance is being given to *kshara varga* (alkaline drugs), its preparation and usage in therapy. But it is in the recent period that *amla/ drava varga* have emerged/ developed to a higher level for both pharmaceutical and therapeutic utilization. All these preparations are from either from metal or mineral resources except for *nimbukamla* where herbal drug is used.

Amla (acidic) preparation are obtained by supply of heat either through evaporation or distillation process. Most of them are solid

in powder form, achieved by evaporation of liquid expect *gandhakamla*, *soraka drava* and *lavana dravaka* which are liquid in state prevailed by distillation. These preparations are *ushna (*hot*), teekshna* (sharp) in character hence have to be used in diluted form to combat its corrosive nature. Hence their doses are also in minimal quantity. *Amla* preparations are used either internally or externally based on need of the disease condition.

Even though the direct reference for therapeutic usage of *nimbukamla* is not seen, it is used in the preparation of other *amla* preparations. Citric acid is used as an organic acid, pH controller, flavouring agent, preservative and antioxidant in food and beverage production. It is used as fungicidal in pharmaceutics.[11] *Gandhakamla* which is known as sulphuric acid was used in the treatment of Asiatic cholera when the discharge are alkaline in modern science.[12] *Tankanamla* indicated in *pradara* is used as boric acid in contemporary science to inhibit the growth of yeast, gram positive and negative bacteria in treatment of fungal and bacterial infections of vagina.[13] It is also used as antiseptic and bland preparation (ointment) for treatment of burn/ *agni dagdha vrna*.[14] Hydrochloric acid used to reduce the basic pH of gastro intestinal tract and treat stomach ailments.[15] *Swarna lavana* a dispersible compound are being used for the general immunity boosting and improving the nerve conduction in brain as gold salts and nanoparticles.[16] Silver nitrate/ *sorakamleeya rajata* was used tropically to treat wounds and ulcers of different organs due to its antimicrobial activity. Now it is also used in the cure of urinary tract infection.[17] Studies have shown that zinc sulphate as topical application show efficacy in skin ailments.[18] This is also used in the preparations of eye drops.

Nimbukamleeya yavakshara and *sarjakshara* even though are week bases is prepared from *nimbukamla* which is acid and *yavakshara, sarjakshara* which are alkalies. In pharmaceutics, tripotassium citrate is used as potassium source an as active ingredient to treat urinary duct stones and renal tubular acidosis.[19] Sodium citrate alkalinizes the urine by promoting urinary excretion of free bicarbonate and prevent the development of renal stone that develop in acidic urine.[20]

Hydrochloric acid is a clear colourless fuming liquid having pungent odour. Heavy metals and sulphated ash should not be more than 5 parts per million and 0.01 percent respectively. It should be stored in an inert container at temperature below 30℃. Nitric acid is a clear, colourless, fuming liquid. Lead

and sulphated ash not more than 2 parts per million and 0.01 percent respectively. Sulphuric acid is an oily, corrosive liquid weighing about 1.84gm per ml.[21] These primary acids used in the preparation of other acids. Hence should be as per API standards.

CONCLUSION:

Amla (acidic) preparations in *rasashastra* are the metals and minerals-based preparations. They are obtained by combination of solid and a liquid either through evaporation or distillation. These preparations have both industrial (for preparation of other acids and bases) and therapeutic utility (in the treatment of ailments) which need to be explored in the field of Ayurveda. Hence, these will open a new way for research as no works have been done till date.

REFERENCES:

1. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Murcchana vijnaniya Taranga: chapter 6, verse 290-95. Varanasi: Chaukhamba surbharati prakashan, 2020: 79-80.
2. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Gandhaka vijnaniya Taranga: chapter 8, verse 113-133. Varanasi: Chaukhamba surbharati prakashan, 2020: 133-135.
3. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Ksharatrika vijnaniya Taranga: chapter 13, verse 100-111. Varanasi: Chaukhamba surbharati prakashan, 2020: 218-219.
4. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Ksharavisheshadi vijnaniya Taranga: chapter 14, verse 47-58. Varanasi: Chaukhamba surbharati prakashan, 2020: 226-228.
5. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Ksharavisheshadi vijnaniya Taranga: chapter 14, verse 165-184. Varanasi: Chaukhamba surbharati prakashan, 2020: 240-242.
6. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Suvarna vijnaniya Taranga: chapter 15, verse 34-41. Varanasi: Chaukhamba surbharati prakashan, 2020: 250.
7. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Rajata vijnaniya Taranga: chapter 16, verse 76-123. Varanasi: Chaukhamba surbharati prakashan, 2020: 267-271.
8. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Seesakadi vijnaniya Taranga: chapter

19, verse 149-166. Varanasi: Chaukhamba surbharati prakashan, 2020: 319-321.

9. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Ksharatrika vijnaniya Taranga: chapter 13, verse 33-41. Varanasi: Chaukhamba surbharati prakashan, 2020: 212.
10. Ravindra angadi, English translation on Rasatarangini of Sadananda sharma. 1st ed. Ksharatrika vijnaniya Taranga: chapter 13, verse 58-71. Varanasi: Chaukhamba surbharati prakashan, 2020: 214-215.
11. Nitin G Kanse et al. A review on citric acid production and its application. International journal of current advanced research. 2017; 2022 sep [cited]. 6(9); 5880-5883. Available from- http://dx.doi.org/10.24327/ijcar.2017.5883.0825
12. Chenery E. The sulphuric acid treatment of cholera and other choleraic diseases. The journal of the american medical association. 1893 apr 15; 2022 sep [cited]. 20(15): 405-406. Available from: http://dx.doi.org/10.1001/jama.1893.02420020001001
13. Powell A, Ghanem K G, Tuddenham S. Clinicians use of intravaginal boric acid maintenance therapy for recurrent vulvovaginal candidiasis and bacterial vaginosis. Sexually transmitted diseases. 2019 dec; sep 2022 [cited]. 46(12): 810-812. Available from: http://d.doi.org/10.1097/OLQ.0000000000001063
14. Pfeiffer C C, Hallman L F, Gersh I. Boric acid ointment a study of possible intoxication in the treatment of burns. JAMA network. 1945; 2022 sep [cited]. 128(4): 266-274. Available from: http://dx.doi.org/10.1001/jama.1945.12860210022006
15. Reed B. The place of hydrochloric acid in the treatment of diseases of the stomach. JAMA network. 1898; 2022 sep [cited]. 31(15): 818-821. Available from: http://dx.doi.org/10.1001/jama.1898.92450150001001b
16. Fricker S P. Medical uses of gold compounds: past present and future. Gold bulletin. 1996; 2022 sep [cited]. 29(2): 53-60. Available from: https://link.springer.com
17. Sekito T et al. Medical uses for silver nitrate in the urinary tract (review). World academy of sciences journal. 2022 jan; 2022 sep [cited]. 4(1): 141. available from: https://doi.org/10.3892/wasj.2022.141

18. Gupta M, Mahajan V K, Chauhan P S. zinc therapy in dermatology: a review. Dermatol Res Pract. 2014 [online]; 2022 sep [cited]. Available from: https://doi.org/10.1155/2014709152
19. Zmonarski S C et al. therapeutic uses of potassium citrate. 2001; 2022 sep [cited]. 58(2): 82-86. Available from: https://pubmed.ncbi.nlm.nih.gov/11475849/
20. Johnson M, Hillier K. sodium citrate. The comprehensive pharmacology. 2007. Available from: https://www.sciencedirect.com
21. Government of India. The Ayurvedic pharmacopoeia of India, 1st edition, part 1, volume 7. Metals and minerals. 95-120.

CITE THIS ARTICLE AS

Ramya M Pavate, Vinaykumar R. Kadibagil, Gazala Hussain, Manaswini K R, Prakruthi T S, Sandeep Y. Amla preparations with special reference to classical text Rasatarangini.. *J of Ayurveda and Hol Med (JAHM)*. 2022;10(4):95-105

Source of support: None**, Conflict of interest:** None