



Research Article

PHARMACEUTICAL STANDARDIZATION OF *SHARPUNKHA KSHAR (LAVANA)*: A
MIRACULOUS HEPATOPROTECTIVE DRUG

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ABSTRACT

This study is ensuring the standard operative process (SOP) of *Sharpunkha Kshar (Lavana)* (alkaline extract of *Tephrosia purpuria* Linn.), as per classical text. It has hepato-protective effect. Many researchers have been done on *Sharpunkha* extract but, no one work has been done on standardization of *Sharpunkha Kshar (Lavana)* yet. It was 1st mentioned by Acharya Bhavprakash in *Gulma chikitsa prakaran* by the name of *Sharpunkha Lavana*. During standardization of *Sharpunkha Kshar (Lavana)* raw drug authentication was done by microscopic and physico chemical analysis. lupeol, rutin, quercetin, rotenone and beta sitosterol biomarkers were screened in raw *Sharpunkha panchang* powder in HPTLC finger printing. *Kshara* was prepared by two different methods with 4 times (SPK-4) 6 times (SPK-6) water following standard protocols. Average 46.44% yield was obtained after drying of fresh *Sharpunkha panchang*. After burning of dry *Sharpunkha* average 5.03% ash was achieved. Average 16.3% *Kshar* yield in batch SK-4 and 16.6% *Kshar* yield in SK-6 was obtained. One more batch from residual ash was also prepared, 6.64% *Kshar* was obtained in it. Organoleptic, physico-chemical parameters were also done for both batch of *Sharpunkha Kshar (Lavana)*. pH (12.65 & 13.35 in SK-4, SK-6 respective) carbonate, bicarbonates, Na (0.56 & 0.52%), and K (35.26, 35.41%) respectively present in batch SK-4 & SK-6.

INTRODUCTION

In Ayurveda the greatest emphasis is given to the complete knowledge of *Ausadh* (drugs) including identification, procurement, processing, preparation, storage and application under a separate branch of learning is called "*Bhaishajya Kalpana*."

The use of herbal plants or their primary and secondary metabolites for curing diseases has long been in continuation since ancient times due to its therapeutic efficacy and safety. Various herbal plants have been investigated for their hepatoprotective potential to treat different types of liver disorder, *Sharpunkha (Tephrosia purpuria)* is one of them. In Ayurvedic classics *Sharpunkha* is indicating in "*Yakrit-PLIHA roga*" *chikitsa*. Its *Panchng churna* (whole plant

powder), extract and *Kshar* (alkali of whole plant) are used in day to day practice.

Sharpunkha Kshar (Lavana) is one of the important *Kshar*. It is an alkali extract obtained from the water-soluble ash of *Sharpunkha Panchanga*. It was 1st introduced by Bhavprakash in *Gulma chikitsa adhyaya* by the name of *Sharpunkha Kshar (Lavana)*.^[1] And Acharya Priyavrita Sharma also mentioned *Sharpunkha Kshar (Lavana)* in different formulations of *Sharpunkha*. Its method of preparation is as same as *Kshar*. In clinical practice it is used in *Yakrita roga*, *Pliha roga* and *Gulma, Udararoga* etc.

An Ayurvedic preparation of medicine involves multi step procedures so it increases difficulties in standardization and subsequent quality control of the finished product. Therefore, here attempt was made to standardize the procedures of *Sharpunkha Kshar (Lavana)* by doing keen observation and documentation of each and every step will be carried out. Authentication of raw drug was also done by doing pharmacognostical, physicochemical and instrumental analysis. During pharmaceutical preparation of

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Sharpunkha Kshar (Lavana) temperature, time, yield, loss in gm and % was keenly observed and documented also. organoleptic characters, physicochemical parameters and contents of *Kshara* were also analyzed.

MATERIAL AND METHODS

Procurement and authentication of drug:

Sharpunkha panchang was collected in fully matured condition from campus DRSRAU, Jodhpur. Authentication of *Sharpunkha* was done on the basis of pharmacognostical as well as physico-chemical characters.

Botanical name	<i>Tephrosia purpurea</i> (L.) Pers.
Crude drug sample collection	Rajasthan
Part used	Whole Plant

Showing physico-chemical parameters of raw *Sharpunkha panchang churna*

Parameters	Practical value
Total Ash	3.96%
Acid- insoluble Ash	0.80%
Alcohol soluble extractive values	7.10%
Water soluble extractive	13.93%
LOD	5.09%
pH of 10% aqueous solution	5.85

Instrumental analysis

- HPTLC was done by sophisticated CAMAG HPTLC instrument. Extract of *Sharpunkha panchang churna* was prepared using ethanol and water (in ethanol: water 1:1) by using Soxhlet apparatus.
- Distinct bands of lupeol and β - sitosterol was observed at Rf 0.52 and 0.38 respectively, And Rotenone was observed at Rf of 0.45.
- The maximum absorption for Rotenone, β - sitosterol and lupeol was observed at 443nm, 521nm, 526 respectively.
- A distinct band of rutin at Rf of 0.32 and max absorption was observed at 276 nm.
- The densitometric scanning was done at 254nm for quercetin.
- Rf come out at 0.55 and max absorption was observed at 313nm.

Procedure	
Extract	Ethanolic extract (100mg/ml)
Stationary phase	HPTLC precoated plate silica gel 60 F ₂₅₄ of 0.2mm thickness
Volume of sample	10 μ l
Distance travelled by solvent system	7cm
Development chamber	Twin trough chamber (10*10cm) with SS lid
Mobile phase	Toluene: Ethyl Acetate: Formic Acid (7:3:0.1) v/v/v
Derivatizing agent	Anisaldehyde-Sulphuric acid (Heating at 105°C for 5 min)

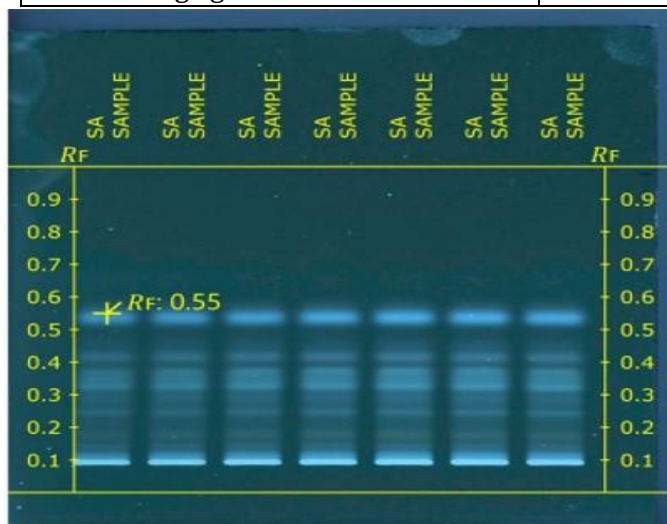


Fig.1 QUERCETIN(Rf 0.55)

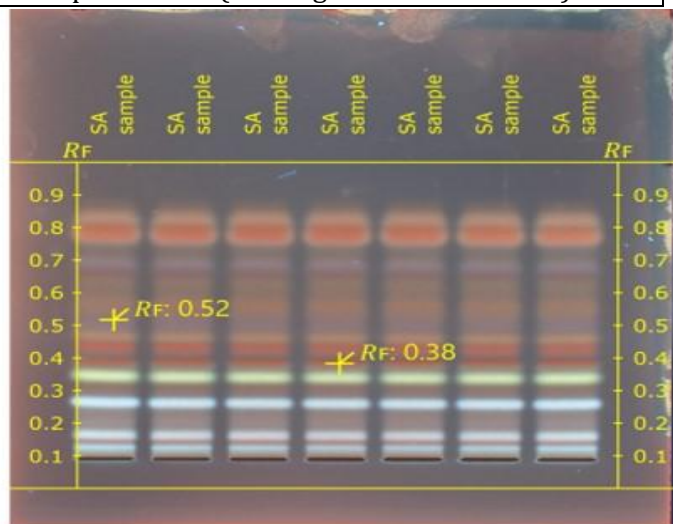


fig. 2 beta sitosterol(Rf 0.38), lupeol (Rf 0.52)

1. Preparation of drug: *Sharpunkha Kshar (Lavana)* was prepared in departmental laboratory by two different methods. (SK-4 AND SK-6) 3 batches were prepared by each method to standardize the process. *Kshar* was also prepared from residual ash.

2. Analysis of finished drug: Both the batches of *Sharpunkha Kshar (Lavana)* were analyzed from NABL approved cultivator phytolab, Jodhpur.

Preparation of *Sharpunkha Kshar (Lavana)*

This procedure was containing multi step:

1. Collection of raw *Sharpunkha*
2. Drying of collected fresh *Sharpunkha*
3. Burning of dried *Sharpunkha* to prepare ash
4. *Kshar jala* preparation
5. *Kshar* preparation from *Kshar jala*

Collection of raw *Sharpunkha*

Total 153 kg fresh *Sharpunkha panchang* was collected in 3 batches. As shown in-

Table 1: Showing collection of Raw *Sharpunkha panchang*

S.No.	Batch no.	Quantity (kg)	Total(kg)
1.	1 st	38.900	152.950
2.	2 nd	62.800	
3.	3 rd	51.250	

Drying of collected fresh *Sharpunkha*

Collected *Sharpunkha* was dried in 3 different batches. Average 46.44% yield was found after drying of *Sharpunkha Kshar (Lavana)*.

Table 2: Showing drying of fresh *Sharpunkha panchang*

S. no.	Wt. of fresh <i>Sharpunkha panchang</i> (kg)	Wt. of dried <i>Sharpunkha panchang</i> (kg)	Yield in %	Average yield in %
1 st batch	38.900	17.280	44.42	46.44
2 nd batch	62.800	30.00	47.78	
3 rd batch	51.250	24.150	47.12	

Burning of dried *Sharpunkha* to prepare ash

Dry *Panchang* of *Sharpunkha* was burned little by little taking iron vessel capacity of 50 lt in open air. After complete burning of drug whitish grey colored ash was obtained. This process was also done in three batches. Average 5.03% yield of ash was obtained from burning of dried *Sharpunkha panchang* as mentioned in below table.

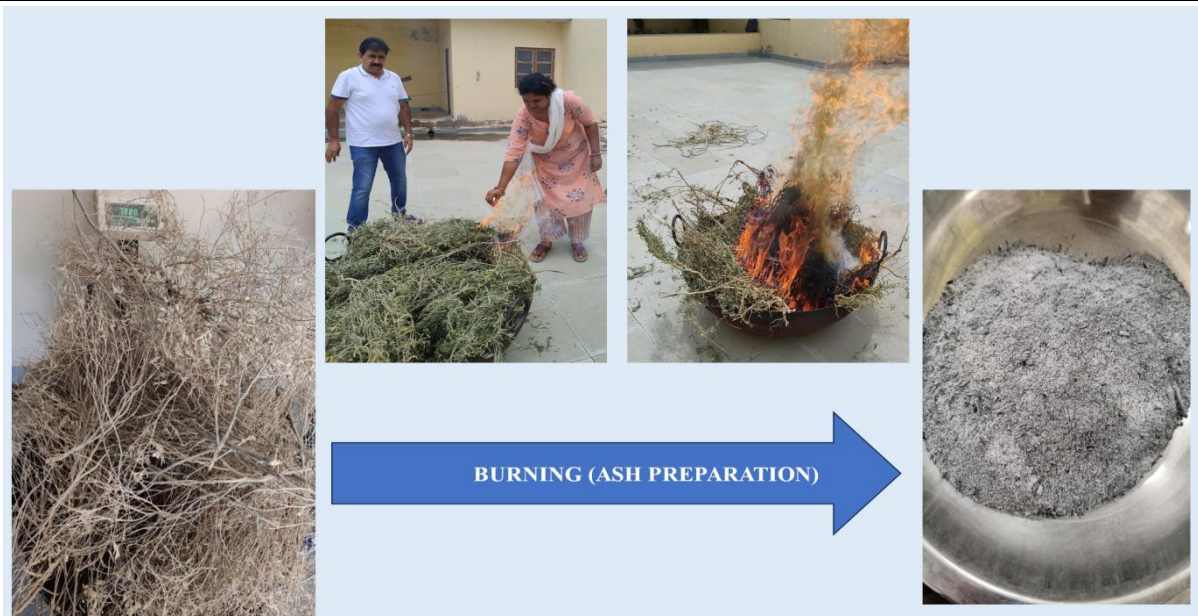
Table 3: Showing burning of dried *Sharpunkha panchang*

Batch no.	Wt. of dried <i>Sharpunkha</i> (gm)	Wt. of obtained <i>Sharpunkha</i> ash (gm)	Yield in %	Average yield in%	Approximate time taken to prepare whitish gray ash (in minutes)
1 st batch	17.280	660	3.8	5.03	40
2 nd batch	30.000	1.600	5.3		50
3 rd batch	24.150	1.449	6		45

Ksharjala was prepared in wide mouthed steel vessel capacity of 10lt with 23.9cm of depth and 22.2cm diameter. *Kshar jala* was filtered through syphon tube method and 1st time collected supernatant liquid again filtered through filter paper to obtain clear, transparent liquid.

Preparation of *Sharpunkha* ash

The dried *Sharpunkha panchanga* was put in a large iron pan and burned. Following the self-cooling process, greyish white ash was found. (Picture showing preparation of *Sharpunkha* Ash)



Preparation of *Kshara jala*

Collected ash was divided 6 parts each part having 500gm ash in 1st batch (SPK-4)³. One part of ash was placed in steel vessel and 4 times water was added to it. Proper rubbing was done with hands and kept for sedimentation for 3 hrs without disturbing the mixture supernatant liquid was separated through syphon tube and filtrate was again filtered from 3 folded cloth, obtained 2nd filtrate again filtered through filter paper. This method was repeated in two more batches. In 2nd method (SK-6)⁴ *Ksharjala* was prepared with 6 times water (SPK6) poured in 500gm ash. The ash was mashed with water thoroughly with hands and left undisturbed for 12 hrs. Similar method was adopted for filtration of *Ksharjala* but in this batch *Kshar jala* was filtered for 21 times followed by filter paper.

At last residue ash of all batches rinsed and rubbed with 4 times water (SPK-R) and kept for sedimentation. Clear liquid was collected followed by same method. (Picture showing preparation of *Ksharjala*).

• Kshar preparation



Preparation of *Sharpunkha Kshar (Lavana)*

Sharpunkha Kshar (Lavana) was prepared from obtained *Kshar jala* in total 9 batches (3 from SKJ-4, 3 from SKJ-6, 3 from SKJ-R). *Kshar jala* was heated till complete evaporation of water content. Average temperature during process 70-80°C was observed.

Table 4: Showing observation & results of Sharpunkha Kshar (Lavana)

S.N.	Process	Average value of each batch		
		SPK4	SPK6	Residual ash
1.	Average quantity of ash (gm)	500	500	1500
2.	Average Amount of water (times)	4times	6 times	4 times
3.	Average Amount of water (ml)	2000	3000	6000
4.	Average Duration for sedimentation	3 hrs	12 hrs	3 hrs
5.	Average Filtered liquid by tube (1 st filtration) (ml)	1158	1897	2033
6.	Average amount of Filtered liquid by filter paper (ml)	1153	1873	2020
7.	3 layered cloth for 21 times (ml)	1152	1853	2010
8.	Average time taken for complete evaporation of filtrate	36 min	50 min	55 min
9.	Average yield (in gm)	81.5	83	99.67
10.	Average yield (in %)w/v	16.3	16.6	6.64



Analysis of Sharpunkha Kshar (Lavana)

Physico-chemical parameters of Sharpunkha Kshar (Lavana): pH, LOD, water soluble extractive, alcohol soluble extractive, Na, K, carbonate and bicarbonate of SPK4 and SPK6 Kshar was done as mentioned in API Part II vol IV.[5-10]

Table 5: Showing physico-chemical parameters of Sharpunkha Kshar (Lavana) prepared with three methods

S.No.	Parameter	Unit	Result SPK4	Result SPK6	Test Method
1	pH value (10% aqueous suspension)	-	12.65	13.35	API Part II Vol IV: 2017
2	Loss on drying at 105°C (Moisture Content)	%	9.23	9.01	API Part II Vol IV: 2017
3	Water Soluble extractive	%	99.20	99.90	API Part II Vol IV: 2017
4	Alcohol Soluble Extractive	%	5.67	14.91	API Part II Vol IV: 2017
5	Sodium (Na)	%	0.56	0.51	API Part II Vol IV: 2017
6	Potassium (K)	%	35.26	35.41	API Part II Vol IV: 2017
7	Carbonates	-	Present	Present	API Part II Vol IV: 2017
8	Bicarbonates	-	Present	Present	API Part II Vol IV: 2017

OVERALL OBSERVATIONS AND RESULTS

- After complete burning of dry *Sharpunkha panchanga* grey white color ash was obtained,
- *Kshar jala* of SPK4, SPK6 and residual ash, after complete sedimentation obtained yellowish white in color.
- *Kshar jala* of all batches gets more transparent and clearer after completion of all filtrations [3].
- When *kshar jala* was heated on medium flame it become more concentrated and less transparent.
- After complete evaporation of water there was crackling sound and off-white color *Kshar* was obtained from all batches.
- Average yield of *Sharpunkha* ash was 5.03% from dried *Panchang sharpunkha*.
- Average yield of *Sharpunkha Kshar (Lavana)* prepared with 4 times water was 16.3% w/w and 16.6% w/w, average yield of *Sharpunkha Kshar (Lavana)* prepared with 6 times of water was obtained.
- Average yield from residual ash was 6.64% w/w.
- pH of *Sharpunkha Kshar (Lavana)* in SK-4 & SK-6 was 12.65 and 13.35 respectively.
- Water soluble extractive 99.20% & 99.90% respectively in both batches
- Alcohol soluble extractives 5.67% & 14.91% in SK-4 & SK-6 respectively.
- Higher amount of K present in both batches - 35.26 & 35.41.
- 0.56 & 0.51% Na present in both batches respectively.
- Carbonates and bicarbonate were also present in both batches SK-4 & SK-6.
- Final product should be stored in a tight glass container to prevent atmospheric reactions.

DISCUSSION

The preparation of *Sharpunkha Kshar (Lavana)* has been done in the current study, accordance with the traditional text (*Bhavprakash, Gulmachikitsa*). Pharmaceutical standardization of trial drug has been done according to standard protocol. 1st of all raw material authentication was done, after that optimum drying of *Panchanga* has been done. Then burning of dried *Sharpunkha* was done, burning the plant in a vessel will help to avoid contamination and other foreign matter. Dried *Sharpunkha Panchanga* should be added to the fire gradually and flipping was also done for optimal ultimately it will help in formation of white ash. For the preparation of *Ksharajala*, ash and water were taken w/v. in many researches demineralized water has been used instead of tap water in order to prevent any interference from the inorganic salts found in tap water, but on large scale it can't possible. To avoid possible chemical reactions, for

dipping of ash in water stainless steel vessel was used or an appropriate nonreactive vessel can be use. Mud pot should not be used to prevent loss of *Kshar jala*. For optimal mixing, ash needs to be thoroughly rubbed in water and given at least three hours to settle in SPK4 and twelve hours in SPK6. *Ksharajala* should be carefully filtrate through the outlet without causing any disturbance to the vessel. It is necessary to take action to prevent sediments from entering. For this, three layers of clean cotton cloth and filter paper are recommended. Color of *Kshar* depends on filtration, due to more filtration white *Kshar* get obtained. If sedimentation time is high, (12 hrs in SK-6) separation of *Kshar jala* get easy because interruption in filtration will be less. *Ksharajala* was once a transparent liquid with a yellowish hue. Temperature was directly correlated with an increase in agglomeration, fumes, and crackling sounds. As the temperature raise, the color progressively changed from yellowish to brownish. In the latter stages, *Kshara* began adhering to the vessel, and bumping was noticed. At this point, it was gently swirled to avoid bumping and sticking. At last, *Kshara* with an off-white color was acquired. To increase the yield of *Kshar kshar* should be prepare residual also. The average percentage of *Kshar* (w/w) in SPK4, SPK6 and from residual ash was 16.3%, 16.6% and 6.64%. in physico chemical parameters pH of *Kshar* suggest *Sharpunkha Kshar (Lavana)* is a strong *Kshar*. 99% water soluble extractives indicated that *Kshar* is completely soluble in water and less soluble in alcohol as alcohol soluble extractives found 5.67 & 14%. Presence of higher percentage of potassium, sodium, carbonate, bi-carbonate are indicated that *Sharpunkha Kshar (Lavana)* is highly alkaline in nature.

CONCLUSION

- ❖ Most suitable Method for the preparation of *Sharpunkha Kshar (Lavana)* was SPK-6 as yield was higher in comparison to SK-4 16.6% and 16.3% respectively. Yadav ji trikam ji told advance Filtration process (21 times) in comparison to *Rasataranginikar* (one time from three folded cloth).
- ❖ Filter paper is most appropriate for filtration of *Kshar jala* to obtain clear crystal *Kshar jala*.
- ❖ To increase yield of *Kshar*, residual ash should be also used for *Kshar* preparation.
- ❖ *Sharpunkha Kshar (Lavana)* is a strong *Kshar*.

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