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Pharmaceutical Preparation Of Kokilaksha Kshara(Asteracantha Longifolianees.) And Its Preliminary Analysis

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ABSTRACT

Introduction: Kshara(Alkali) is a alkaline substance which may be prepared from mixture of many herb or single herb. Kokilaksha(Asteracantha longifolia Nees.)is one such plant having wide therapeutic effect in Ayurvedic classics likeVatarakta(Gout),Shotha(Inflammation), Anidra (Insomnia) and many more. The present study is concern with Kokilaksha Kshara which has been mentioned in Sushruta Samhita in the treatment of Plihodara(Splenomegaly).**Aim:**Theaimof current studyistoprepare Kokilaksha Kshara (Asteracantha longifoliaNees.) and developthe preliminary analytical profile of KokilakshaKshara.

Materials and Methods: Three batches of Kokilaksha Kshara were prepared and their parameters were recorded.The raw material, in process material and finished product were analysed for organoleptic characteristics, physicochemical parameters like Loss On Drying, Total Ash, Acid Insoluble Ash, Water Soluble Extractive, Alcohol Soluble Extractive, Specific Gravity, Total Solid Content, pH andQualitative Phytochemical Parameters.**Results:**An average of 34.21% and 7.1%KokilakshaKshara was obtained after 1st and 2nd washrespectively in contexts to ash.The prepared Kokilaksha Kshara has an average 1.08% Loss on drying, 93.80 % total ash, 0.79% acid insoluble ash, 99.58 % water soluble extractive, pH of10.73 and not observed anyqualitative phytochemicals.**Conclusion**:Themethod for Kshara preparation adopted here is yielded more. The findings obtained of the pharmaceutical and preliminary analysis can be utilised further research work on large scale production.

KEYWORDS: Kokilaksha,Asteracantha longifolia Nees., Kshara**,**Preliminary Physico-chemical parameters.

I. INTRODUCTION

Pharmaceutical preparation is the process of converting natural substances into effective dosage forms using various techniques that act as medicines and are easily absorbed by the human organism. As world health organization highlighted the need of using herbal plants to resolve public health issues. In this concern, Ayurvedic formulations need to be developed and revalidated using both historical and contemporary criteria.Kshara are alkaline substances obtained from the ash of drugs. Asper Acharya Charaka, Kshara(Alkali) is one among the total 18 parts of plants which have therapeutic properties. Kshara Kalpana (Alkali preparation) is a one such a way of preparing medicines from theash of plants, animals or minerals. Various Ayurvedic texts explain the different kinds of Kshara and its preparation process including ratio of ash to water, soaking time, cloth fold, filtration pattern, vessel specifications along with its indications and therapeutic uses.

Asteracantha longifolia is mostly referredas Ikshura, Ikshugandha and Kokilakshain Ayurvedic literature. It is an erect, annual plant that grows as a weed over the plains of India, particularly in swampy areas. Different parts of Kokilaksha such as Beeja (Seed), Moola (Root), Patra (Leaf), Bhasma (Ash)and Panchaga (Whole plant)are utilized to prepare the various formulations.It is used as a Vajikarana (aphrodisiacs) and in the treatment of Vatarakta(Gout),Shotha(Inflammation),and many more. Ksharaof this plant has been stated in the treatment of Plihodara(Splenomegaly).

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Inpreviouswork on pharmaceutical standardization of AsteracanthalongifoliaKshara19.08% yield was obtained in compare to ash material. Previous work on Kshara has been showed that subsequent wash of Kshara, ratio of ash and water taken volumetricallyand increasing soaking time duration of ashyielded more Ksharapercentage. So, here to obtain more yield, slight modification in the preparation of KokilakshaKshara has been done. Theaimof current studyistoprepare Kokilaksha Kshara and evaluate the preliminary analytical profile of Kokilaksha Kshara.

II. MATERIALS AND METHODS

Collection and authenticationof the raw material

MaturedKokilakshaPanchangawas collected from Junagadh, Gujarat in the month of February 2022 by adopting Good Collection Practices Guidelines. The drug was identified and authenticated in the pharmacognostical laboratory of Upgraded department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat.

PreparationofKokilaksha Kshara

Total three batches of Kokilaksha Ksharawere prepared as per the general method of Ksharapreparationmentioned in AFIwithslightmodification (two washes with increasing soaking time duration, ratio of water and ash taken volumetrically)at pharmaceutical laboratory of Upgraded Department of Rasashastra and Bhaishajya Kalpana, Government Ayurved College, Vadodara, Gujarat.Prior to addressing the main pharmaceutical process, a pilot study was conducted in order to look at possible outcome and common challenges that could affect the procedure. After considering the finding of pilot study, main batches were created by using the same approach to achieve the reproducibility of the process. Whole process can be divided as follows:

1. Preparation of Kokilakshaash

Total 480 Kgofmatured KokilakshaPanchagawas collected and completely dried under sunlight. After drying, total 146 Kg KokilakshaPanchaga obtained which was taken for the ash preparation. Dried KokilakshaPanchangawasignitedand burnt completely in an open environment by placing it inan iron pan. After self-cooling, greyish-whitecoloured ash wascollected[Figure 1(a) -1(d)].

2. Preparation ofKokilakshaKsharajala

In each batch, one Kg Kokilaksha Ash wastakenvolumetricallyinastainless-steel vesseland six times of potable water was added.Contents were rubbed thoroughly with hand and leftundisturbed for 24 hours. Next day,the clear supernatant liquid was decanted by rubber tubeinto another vessel and filtered three times through seven folded cotton cloth.[Figure 1(e) -1(i)] For the 2nd wash of residual ash, potable water was taken in quantity similar to 1st wash filtrate. It was then rubbed and filter in same manner to obtain Ksharajala.

3. Preparation of KokilakshaKshara

Ksharajalaobtained from the two washes were placed in a stainless-steel vessel individually and heated over a gas stove to evaporate the water content completely, resulting in Kshara.[Figure 1(j) -1(o)] Ksharawas keptin an air tight glasscontainer.

Preliminary analysis

Preliminaryanalysis of raw drug, intermediate and finished drug were carried outat Quality Control Laboratory, Upgraded Department of Rasashastra and Bhaishajya Kalpana, Government Ayurved College, Vadodara. The raw drug was analysed by organoleptic characteristics (like color, odour, appearance, texture and taste),physicochemicalparameters (including LossOnDryingat105°C, Total Ash (%w/w),AcidInsolubleAsh (%w/w), Water Soluble Extractive(%w/w), Alcohol Soluble Extractive (%w/w), pH) and Qualitative Phytochemical Parameters. The intermediate product was analysed by organoleptic characteristics along with pH,specific gravityand total solid content. The finished product was also analysed by organoleptic characteristics, physicochemicalparameters (like lossondrying at105°C, total ash (%w/w),acidinsolubleash (%w/w), water soluble extractive (%w/w) and pH) and phytochemical parameters.

III. OBSERVATIONS AND RESULTS

Total 480 Kg KokilakshaPanchangawere collected and after drying it was weighed total 146 Kg. Total 69.58% loss was found. It was burnt quickly due to dried state. Seeds of Kokilaksha took more time to burn than other parts of Kokilaksha.After self-cooling, the whitish grey colour ash was obtained.After complete burning of material,Kokilaksha ash obtained from dry

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Panchanga was 8.51%.Detail results are given in table no. 1.

After mixing of ash with potable water, on next day ash was settled down at the bottom of the vessel and few particles were floating onupper surface of vessel seen.Ksharajalawas clear liquid with slight yellowish tinge in appearance after filtration.The percentage of Ksharajala obtained was 84.31% and 94.76 % v/vin 1st wash and 2nd wash respectively. [Table No.2] The temperature of flame and liquid media was recorded at regular intervals of 30 minutes. [Chartno.1] The minimum temperature recorded of liquid media was25°Cwhile maximum temperature was99°C.

Table No. 1: Results obtained during preparation of Kokilaksha Ash

Parameters			**Result**
Total quantity of Kokilaksha Panchanga	Wet	Kg	480
	Dried	Kg	146
Weight loss of Kokilaksha Panchanga after drying		Kg	334
		%	69.58
Total days required for drying		days	20
Total time taken for preparation of Kokilaksha Ash		hrs.	16
Final weight of KokilakshaPanchanga Ash		Kg	12.43
		%	8.51
Total loss		Kg	133.57
		%	91.49
Reason of loss	Due to burning of organic part of the material.		

Table No. 2: Results obtained during preparation of Kokilaksha Ksharajala

Parameters			**Result**			
			Batch-1	**Batch -2**	**Batch -3**	**Average**
Total quantity of Ash taken		L	1.7	1.7	1.7	1.7
		Kg	01	01	01	01
Total quantity of water taken	1st Wash	L	10.2	10.2	10.2	10.2
		Kg	10.098	10.098	10.098	10.098
	2nd Wash	L	8.850	8.630	8.590	8.690
		Kg	8.762	8.544	8.504	8.603
Totalquantity of Ksharajala obtained (after filtration)	1st Wash	L	8.850	8.630	8.590	8.690
		Kg	8.823	8.598	8.542	8.654
	2nd Wash	L	8.430	7.980	8.220	8.210
		Kg	8.379	7.946	8.202	8.176
% of Ksharajala obtained	1st Wash	v/v	86.76	84.61	84.22	85.20
		w/w	86.77	84.15	84.59	85.17
	2nd Wash	v/v	95.25	92.47	95.69	94.47
		w/w	95.63	93.00	96.45	95.03
Totalquantity ofloss	1st Wash	L	1.350	1.570	1.610	1.510
		Kg	1.275	1.500	1.556	1.444
	2nd Wash	L	0.420	0.650	0.370	0.480
		Kg	0.383	0.598	0.302	0.427
% ofloss	1st Wash	v/v	13.24	15.39	15.78	14.80
		w/w	13.23	14.85	15.41	14.50
	2nd Wash	v/v	4.75	7.53	4.31	5.53
		w/w	4.37	7.0	3.55	4.97
Reason of loss	Due to decantation and filtration of Ksharajala.					
Total time required for the preparation of Kokilaksha Ksharajala (hrs)			24	24	24	24

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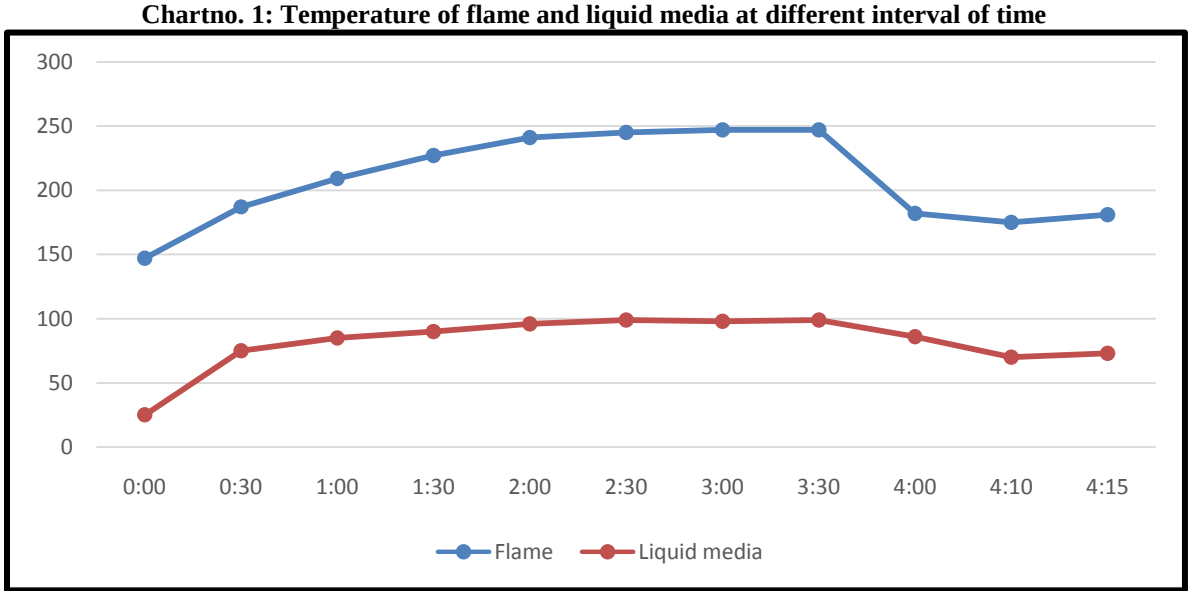
Chartno. 1: Temperature of flame and liquid media at different interval of time



After 30 minutes of heating, Ksharajala started to evaporate and characteristic odour was found. Gradually, vapours were increased and followed by frothing was seen. After one hour of heating, boiling of Ksharajala was started which was intense along with some aggregation seen after two hours of heating.Gradually, Ksharajala became dense and followed by changed into the semisolid consistency. In last stage, creaking sound was heard and semisolid mass was converted in white Kshara.An average of 34.35 % and 6.92 % Kshara was obtained from 1st and 2nd wash respectively in compared to ash. [Table No.3].

Table No. 3: Results obtained during evaporation of Kokilaksha Ksharajala

Parameters			**Results**			
			Batch-1	**Batch -2**	**Batch-3**	**Average**
Total quantity of Ksharajala	After 1st wash	L	8.850	8.630	8.590	8.690
		Kg	8.823	8.598	8.542	8.654
	After 2nd wash	L	8.430	7.980	8.220	8.210
		Kg	8.379	7.946	8.202	8.176
Time taken for evaporation of Ksharajala (hrs : min)			4 :15	4 :10	4 : 15	4 : 13
Kshara obtained	After 1st wash	ml	310	305	315	310
		g	343.20	338.87	344.10	342.06
	After 2nd wash	ml	65	65	65	65
		g	70.95	70.97	70. 89	70.94
% of Kshara obtained	After 1st wash	v/v	18.24	17.94	18.53	18.24
		w/w	34.32	33.89	34.41	34.21
	After 2nd wash	v/v	3.82	3.82	3.82	3.82
		w/w	7.10	7.10	7.09	7.10
Total quantity of Kshara obtained	1st + 2nd wash	ml	375	370	380	375
		g	414.15	409.84	414.99	412.99
Total quantity of % Kshara obtained	1st + 2nd wash	v/v	22.06	21.76	22.35	22.06
		w/w	41.42	40.99	41.51	41.31
Total loss		ml	1325	1330	1320	1325
		g	585.85	590.16	585.01	587.01
% of loss		v/v	77.94	78.24	77.65	77.94
		w/w	58.58	59.01	58.49	58.69
Reason of loss		Due to evaporation of water.				

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The evaluation of preliminary analysis of raw drug, intermediate and finished product were carried out. The organoleptic parameters of KokilakshaPanchanga Churna, Ash, Ksharajala and Ksharaare stated in table no. 4. The physico-chemical parameters of Kokilaksha Panchanga Churna and Ash arementioned in table no. 5. The Physico-chemical parameters of Kokilaksha Ksharajalaand Kshara are depicted in table no 6and 7respectively. Qualitative phytochemical parameters of KokilakshaPanchanga Churna, Ash and Kshara are mentioned in table no. 8.

Table No. 4: Organoleptic characters of KokilakshaPanchanga Churna, Ash, Ksharajala and Kshara

Sr. No.	Characteristic	Observations			
		Panchanga Churna	Ash	Ksharajala	Kshara
1.	Colour	Creamish yellow	Whitish Grey	Slight yellowish tinge	White
2.	Appearance	Coarse Powder	Powder	Transparent liquid	Fine powder
3.	Taste	Sweet	Salty	Salty	Salty
4.	Texture	Rough	Rough	Non sticky	Smooth
5.	Odor	Characteristic	Characteristic	Characteristic	Characteristic

Table No. 5: Physico-chemical parameters of Kokilaksha Panchanga Churna and Ash

Parameters	Observation		
	Kokilaksha Churna	API Std.	Ash
Loss on Drying(%w/w)	10.26	Not mentioned	1.21
Total Ash (% w/w)	8.35	Not > 9 %	93.04
Acid Insoluble Ash (% w/w)	0.87	Not > 1 %	5.01
Water Soluble Extractive (% w/w)	21.96	Not < 20 %	14.59
Alcohol Soluble Extractive (% w/w)	5.97	Not < 4 %	1.33
pH Value	7.64	Not mentioned	11.41

Table No.6: Physico-chemical parameters of Kokilaksha Ksharajala

Sr. No.	Parameter	Kokilaksha Ksharajala			
		Batch-1	Batch -2	Batch -3	Average
1.	Specific gravity	1.017	1.017	1.020	1.018
2.	pH	10.87	10.98	11.01	10.95
3.	Total solid content	4.46	4.27	5.07	4.60

Table No.7: Physico-chemical parameters of Kokilaksha Kshara

Parameters	Result			
	Batch-1	Batch -2	Batch -3	Average
Loss on Drying (%w/w)	1.08	1.14	1.22	1.15
Total Ash (% w/w)	92.86	94.53	94.01	93.80
Acid Insoluble Ash (% w/w)	0.79	0.77	0.80	0.79
Water Soluble Extractive (% w/w)	99.89	98.97	99.87	99.58
pH	10.34	10.98	10.87	10.73

Table no. 8Qualitative phytochemical parameters of Kokilaksha Panchanga Churna, Ash and Kshara

Sr. No.	Parameters	KokilakshaPanchanga Yavakuta Churna	Kokilaksha Ash	Kokilaksha Kshara
1	Alkaloids	+	-	-
2	Glycoside	++	-	-

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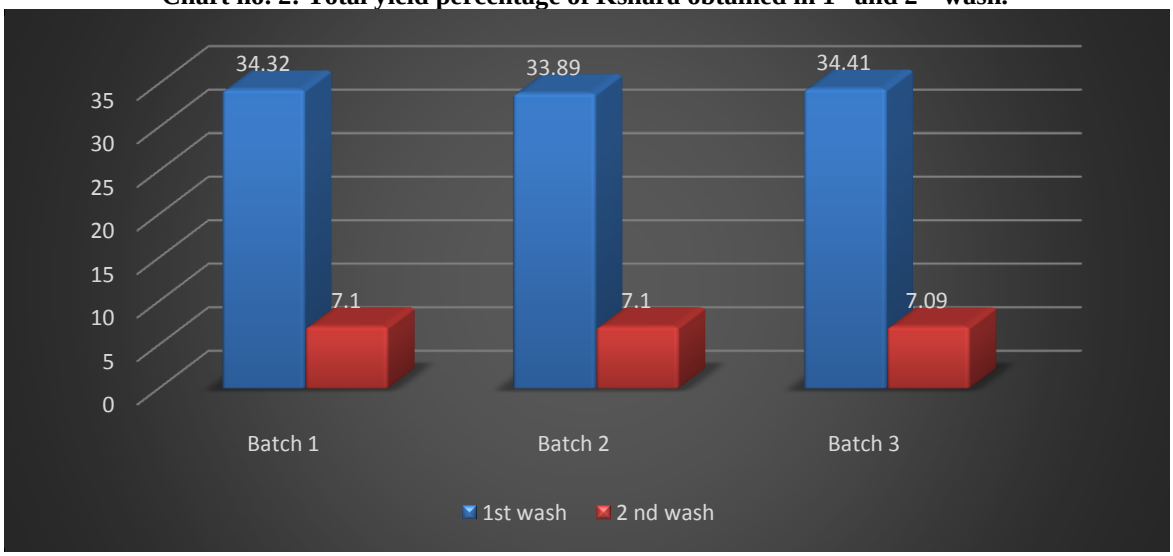
3	Flavonoids	+	-	-
4	Tannin	++	-	-
5	Steroid	++	-	-
6	Terpenoids	+	-	-
7	Saponin	++	+	-
8	Carbohydrate	+	+	-
9	Protein	-	-	-
10	Starch	-	-	-
"+, ++, +++" indicate **Present** in increasing order; "-" indicate **Absent**				

IV. DISCUSSION

Kshara can be administered either internally or applies topically based on the state of the disease.It has been stated that KsharaChikitsa can be able to treat the disorders that difficult to cure. AcharyaChakrapanidatta has prescribed Kshara of Kokilaksha internally with Gomutra (cow's urine) or water in ShothaRoga (oedema). Similarly it is indicated in Mootraashmari (urinary stones),Mootrakrichchha (difficulty in micturition) and Udara Roga (Abdominal disorders).

In the present study, Kokilaksha Ksharahas been prepared by adopting thegeneral Kshara preparation method of AFI with slight modification. Dried Kokilaksha Panchanga was burnt in an open environment to receive enough air to completely burn the substance and convert into grey ash with prevention of carbon formation. Also, in order to obtain a better quality of ash, Kshara was prepared in summer season, which aids the appropriate drying of the collected drugs and provide appropriate atmosphere to burn it. In previous research work on Kokilaksha Kshara 19.08 % yield percentage was obtained in context to ash. As Kshara is recognized as a water soluble ash, some water soluble components of ash may not be completely dissolved in a single wash and remain as residue. Previous work on Kshara preparation also suggested subsequent washes and ratio of ash and water volumetrically to obtain the maximum yield. Here, to get more yield, Ksharajalawasprepared by takingthe ratio of ash and water volumetricallywith two washes in pilot study. For the purpose of maximum dissolving of the ash,needs to be macerated well in water andafter that, kept undisturbed 24 hrs to allow the insoluble substances to settle down. The percentage of Ksharajala obtained from 1st wash and 2nd wash was 85.20% and 94.47% v/v respectively. The percentage of Ksharajala obtained in 2nd wash was higher compare to 1st wash it may be due to more absorption of water portion in 1st wash. Although, the percentages of Kshara acquired from the 1stwash was significantly reduced in the 2ndwash.(Chartno.2)

Chart no. 2: Total yield percentage of Kshara obtained in 1st and 2nd wash.



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The main objective of filtering Ksharajala is to obtain clear, transparent supernatant liquid. For this purpose, the filtration pattern was a factor that our Acharya had a deep insight of it. They have specified number of filtration and multiple-folded cloth to obtain the appropriate quality of Ksharajala.During the boiling of Ksharajala, white froth was observed due to the separation of soapy alkaline salts. With increasing temperature, there was a proportional increase in aggregation, vapours and cracking sounds. The distinct odour of Kshara was also observed throughout the process. Ksharajala initially had a yellowish tinge which was change to a thick off-white colour as a result of the loss of water molecules and the concentration of alkaline substances. However, the finally produced Kshara was white, reflecting the description of Kshara characteristic given in classical writings as "Shukla Varna." During last phase, Kshara began to adhere vessel surface and bumping was seen. In order to avoid bumping and sticking at this point, the material was stirred carefully. The average yield percentage obtained in 1^{st} and 2^{nd} wash was 34.21% and 7.10% respectively in context to ash which is 3.51% in context to dry material. For the prevention of any sort of chemical reaction, wholeprocess of Kshara preparationshould be carried out in a non-reactive stainlesssteel vessel. Kshara should be stored in an airtight glass container due to its hygroscopic nature in order to avoid atmospheric reactions.

In preliminary analysis the pH values suggest the degree of acidity or alkalinity of a sample. Here, in KokilakshaAsh, Kokilaksha Ksharajala and Kokilaksha Kshara sample high pH value are suggesting the alkaline character which indicated by the pH of 11.41, 10.95 and 10.73 respectively. The organoleptic character of KokilakshaKsharalike white in colour, salty taste, smooth texture, characteristic odour and fine powder in appearance. The average loss on drying was 1.15 % within normal limits which was 13.5 % in previous study on Kokilaksha Kshara. The amount of silica present is estimated using the acid-insoluble ash which is a sign of contamination with earthy material. In present studyaverage acid insoluble ash of Kshara was 0.79 % which indicate that samples of all batches are free from contamination of earthy material. The average total ash value of Kshara was 93.80 %. Higher ash value indicate thepresence of high amount of inorganic content in the material such as carbonates, phosphates and silicates of sodium, potassium, calcium and magnesium. The average water soluble extractives value was 99.58% suggesting of more solubility of the drug in aqueous media. There were not any significant variationsin any of the preliminary analysis of organoleptic characteristicsand physicochemical parameters data compared to all batches.

Using the methanol or water-soluble extracts of the samples the qualitative phytochemical parameters were carried out. It shows that KokilakshaPanchanga Churnasample having presence of alkaloids, glycoside, flavonoids, tannins, steroid, terpenoids, saponins and carbohydrate. In Kokilaksha Ash sample only saponin and carbohydrate were present while in the Kokilaksha Kshara sample all the phytochemicals were absent due to there was no organic material as they get destroyed when burnt.

V. CONCLUSION

Method adopted here for Kshara preparation with volumetric ratio of ash, 24 hrs soaking duration and two washes was yielded 41.31% Ksharain compare to ash. This method of preparation for Kokilaksha Kshara can be viewed as simple, efficient and conventional. By the observations and findings from this work can be utilised further research work on large scale production. The current results of the preliminary physicochemical and phytochemical parameter can be used as a reference for Kshara preparation.

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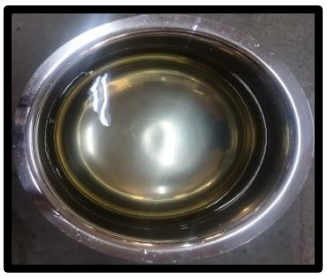
(a)	(b)	(c)
		
(d)	(e)	(f)
		
(g)	(h)	(i)
		
(j)	(k)	(l)
		

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(m)	(n)	(o)

Figure 1: preparation of KokilakshaKshara

(a) Collection of Kokilaksha Panchanga.**(b)** Drying of Kokilaksha Panchanga**(c)**Burning of Kokilaksha Panchangain big iron pan.**(c)**Completely burnt Kokilaksha Panchanga ash **(d)** Ash and water.**(e)**Soaking of ash inwater for 24 hrs.**(f)**Decantation of Ksharajala.**(g)**Filtration of Ksharajala.**(h)**Ksharajala **(j)**Heating of Ksharajala.**(k)**Semisolid form of Kshara.**(l)**Solid white substance deposited as flakes in bottom**(m)**final stage of Kshara preparation**(n)**KokilakshaKshara**(o)**Prepared Kshara stored in airtight glass container.

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