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A COMPARATIVE PHARMACEUTICO-ANALYTICAL STUDY OF *KADALI KSHARA (MRIDU)* PREPARED WITH THREE DIFFERENT METHODS

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ABSTRACT

Background: *Ksharas* are alkaline substances which are classified into *Pratisaraneeya* and *Paneeya* according to mode of administration. *Kadali Kshara* is widely advised in treatment of *Mutrakrichra, Ashmari, Gulma, Mutraghata* etc. This alkaline preparation has many therapeutic usages and can be better alternative to many surgical procedures. But the method of preparation of *Kshara* differs according to various authors. This difference in preparationmethod needs to be addressed properly so that a Standard Operative Procedure (SOP) is developed for all the samples to evaluate its quality, economy and yield. **Objectives:** In this study *Kadali Kshara* was prepared according to 3 different references viz, *Rasa Tharangini, Sharangadhara Samhita* and *Sushruta Samhita.* Analysis of its preliminary physiochemical values done on the basis of API. **Materials and Methods:** Kadali *Panchangas* were collected, dried and burnt completely to make ash. Then *Kshara* was prepared in 3 different methods as per different texts i.e., by the ratio of water added to Ash (1:4, 1:6) soaking time duration (3 hours and 12 hours), folds of cloth (1, 3) and number of times of filtration (1 and 21 times). Then Pharmaceutico analytical study of each *Kshara* has done separately. **Results and Conclusion:** The Pharmaceutico analytical study revealed that, pharmaceutically and analytically the preparation method explained by *Sushrutha Samhita* can be considered as unique and ideal as per present study.

KEYWORDS: *Paneeya Kshara, Kadali Kshara.*

INTRODUCTION

Multifarious nature of drugs utilized in various forms of therapeutic formulations in Ayurveda. *Kshara*[1] is one among such dosage forms. The word *Kshara* is being used in the last 500 years even before the Christ. Maximum contributions towards *Kshara* have come in the period of *Samhita Kala.* Literary meaning of the word *Kshara* is "substance which has corrosive, pungent, saline, acrid nature and possesses the *Ksharana*[2] property".

It is considered as *Uttama* when compared with *Yantra, Shastra, Anushastra* and *Aushadhi.*[3]

The word *Kshara* is derived from the Arabic word which means "calcined ashes", referring to the original source of alkaline substances. *Kshara* is an alkaline substance prepared from the water-soluble ashes of herbal drugs. Acharyas have opined preparations and utilization of different *Ksharas* in different forms. Properties, types and the applications of different *Ksharas* are available in our classics. It can be prepared in various forms like solutions, powders or crystals. In general, all types of *Kshara* are having *Tikshna Guna* and *Ushna Veerya.*[4] They can readily burn the soft tissues; hence they are used in *Dahana Karma.* They are having properties like *Pachana, Ropana, Mootrala* and *Vrana Shodhana.*

Kadali[5] is one among such *Kshara Dravya* which is included under *Lodhradi Gana.* It is having *Madhura- Kashaya Rasa, Guru-Snigdha Guna, Sheeta Veerya* and *Madhura Vipaka*. It is *Vata Pitta Shamaka* and *Kapha Vardhaka.*[6]

Even though general method for preparation of *Kshara* is explained that the collection and burning into the ash form, there are differences in the water proportion, soaking time, number of times of filtration and number of cloth foldings as per different authors.

Acharya Sushruta explained the ratio of 1:6[7] for ash and water where Sh*arangadhara* explained it as 1:4.[8] According to *Rasa Tharangini*[9] & *Ayurveda Prakasha*[10] the ratio is same as that of *Sharangadhara* but the duration of soaking is different.

Based on the potency, *Kshara* can be classified into *Mridu, Madhyama* and *Teekshna Kshara.* In this study *Mridu Kshara* of *Kadali* is prepared where the *Ksharodaka* alone is subjected for further boiling to obtain its dry powder form.

Due to difference in the method of preparation, there may be variations in the physico-chemical parameters as well as the elements in *Kshara.*

AIM AND OBJECTIVES

Aim

- Evaluation of Standard Operative Procedure (SOP) for preparation of 3 different methods of *Kadali Kshara*.

OBJECTIVES OF THE STUDY

- To prepare *Kadali Kshara* in three different methods as per *Sushruta Samhita, Sharangadhara Samhita* and *Rasa Tharangini*.
- To Analyse physico-chemical characters of *Kadali Kshara* prepared by three different methods and compare them.
- To develop Standard operative procedure of *Kadali Kshara*.
- To develop an Analytical profile of *Kadali Kshara*.

MATERIALS AND METHODS

It contains mainly 2 parts;

1) Preparation of Kadali Kshara in 3 different methods
2) Pharmaceutico Analytical Study of Kadali Kshara in 3 different methods and its comparison.

1) Preparation of Kadali Kshara

Method of preparation as per *Sushruta Samhita*[7]

- The whole plant of *Kadali* was collected, dried properly in sunlight and burnt.
- When the ash cools down, it was collected and weighed.
- Ash obtained was taken in a stainless-steel vessel and to these six parts of water was added, stirred well and filtered through a cloth for twenty-one times.
- Filtrate obtained was boiled by stirring with a ladle slowly and constantly.
- When this liquid becomes clear, red in color and slimy, it was filtered through a thick cloth into another vessel and heated again till *Kshara* like fine powder obtained.
- Obtained *Kshara* was collected and kept in an air tight container.

Method of preparation as per *Sharangadhara Samhita*[8]

- Dried plant of *Kadali* was burnt to ash.

- The ash thus obtained was added with four times of water in a mud pot and kept overnight.
- Next day morning the clear supernatant water is decanted into a clean vessel and boiled till all the water evaporates, leaving fine powder at the bottom, which is the *Kshara*.
- That was collected and kept in an air tight container.

Method of preparation as per *Rasa Tharangini*[9]

- The whole plant of *Kadali* was dried and burnt into ash form.
- The ash thus obtained was added with four times of water and macerated.
- The contents are kept undisturbed for 3 hours.
- It was then filtered through a three folded cloth till clear liquid is obtained.
- This filtrate was boiled in an open large vessel with constant and slow stirring to obtain the dry powder form, which is the *Kshara.*
- The *Kshara* thus collected was stored in an air tight container.

Table No. 1: Showing Method of Preparation Carried out As Per Different References.

Sample	Reference	Ash and water ratio	Soaking Time	Filtration of Ksharodaka	No. of folds of cloth
A	*Rasa Tharangini*[9]	1:4	3 hrs	Till clear liquid	3-fold cloth
B	*Sharangadhara Samhita*[8]	1:4	overnight (12 hrs)	Liquid decanted	Single fold
C	*Sushruta Samhita*[7]	1:6	Overnight (12 hrs)	21 times	Single fold

2) Pharmaceutico Analytical Study of Kadali Kshara and its comparison. Phys Kadali Kshara was subjected to various Pharmaceutico analytical study like;

Organoleptic evaluation

- Colour
- Taste
- Odour
- Appearance

Physico – chemical evaluation

Physical test

- Loss on drying

- *p*H analysis
- Total ash
- Acid insoluble ash
- Water soluble ash
- Water and Alcohol soluble extractive

Chemical tests

Assay for Sodium and Potassium.

Instrumental Analysis

SEM – EDAX

OBSERVATION AND RESULTS

Observation of Pharmaceutical Study

i. Weighing of Drugs

- Weight was checked before and after complete drying, prior to burning the drug.
- Weight was checked after burning and after getting the residue
- Drug ash and *Ksharodaka* was measured by volumetric method

ii. Burning of drug

- For burning of drug, the pot is cleaned properly with water and dried.

iii. Selection of vessel

- For Filtration Porcelain beaker and Steel utensil was used for the pouring and collection of filtrates
- For boiling of drug Steel vessel was taken in order to avoid reaction of the drug with the vessel.
- For Stirring Stainless steel laddle used for stirring to avoid reaction

iv. During Drying of Raw Drug

The drug was procured in wet form (moisture was present) and further dried in sunlight into remove the complete moisture it took 35 days.

Table No. 2: Showing Observation during drying of drug.

Drying of Drug	Changes Observed
1st Day	Slightly dried, but presence of moisture can be noticed, Thickness reduced slightly
2nd Day	Drying started, leaves Changes to green to dark greenish colour
10th Day	Dried partially, crackling sound on breaking-absent but bends, Colour –dark greenish, grey
25th Day	Dried completely, crackling sound on breaking slightly +, the raw banana is not dried properly.
35th Day	Dried completely, with crackling sound on breaking Colour–brownish.

v) During Burning

- The burning apparatus cleaned and dried properly.
- Burning was uniform.
- Drug was fully burnt and turned to greyish coloured ashes completely.
- Collected in a bowl and stored in container.

vi) During and afters soaking

- Whole ash is divided equally in three different samples & immersed in different ratio of water, no particles floated over the water surface
- After maceration with hand, it turned slimy and dissolved completely in water
- After soaking the whole ash was settled down and the liquid was peacock green in colour.

RESULTS

The following table shows the standardization parameters of *Kadalikshara* based on standard protocol for *Kshara* as per guidelines of CCRAS.

Here,

- Sample A- Method of preparation as per *Rasa Tharangini*
- Sample B- Method of preparation as per *Sharangadhara Samhita*
- Sample C- Method of preparation as per *Sushruta Samhita*

Table No. 3: Showing Organoleptic characteristics of *Kadali Kshara* (A,B,C).

Parameter	Sample A	Sample B	Sample C
Colour	Greyish White	Greyish White	Greyish White
Odour	Nothing Specific	Nothing Specific	Nothing Specific
Taste	Acrid	Acrid	Acrid
Appearance	Fine powder, Soft in touch	Fine powder, Soft in touch	Fine powder, Soft in touch

Table No. 4: Showing Analytical parameters for *Kadali Kshara*: Result % w/w.

Parameter	Sample A	Sample B	Sample C
Loss on drying	3.85	4.03	4.67
Total ash	77.04	74.626	75.096
Acid insoluble ash	20.663	16.073	23.439
Water soluble ash	38.168	45.165	39.146
Water Soluble Extractive	44.8	55.44	47.60
Alcohol Soluble Extractive	10.72	10.16	8.80
Ph	12.88	12.88	12.81

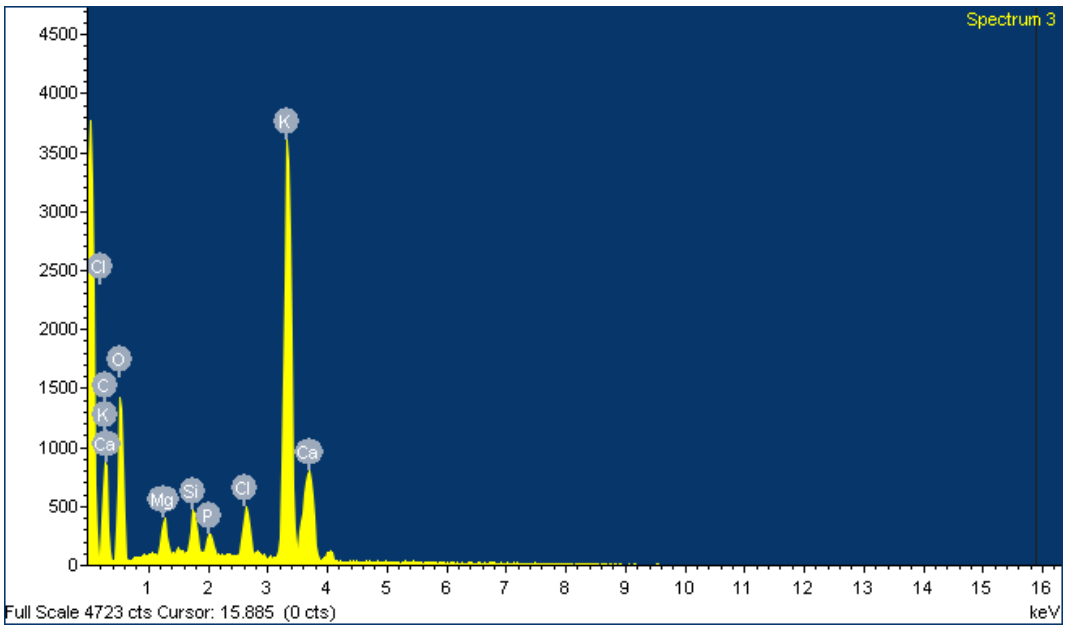
Quantitative element analysis of *Kadali Kshara* samples.

Table No. 5: Showing Observation of quantitative analysis results of *Kadali Kshara.*

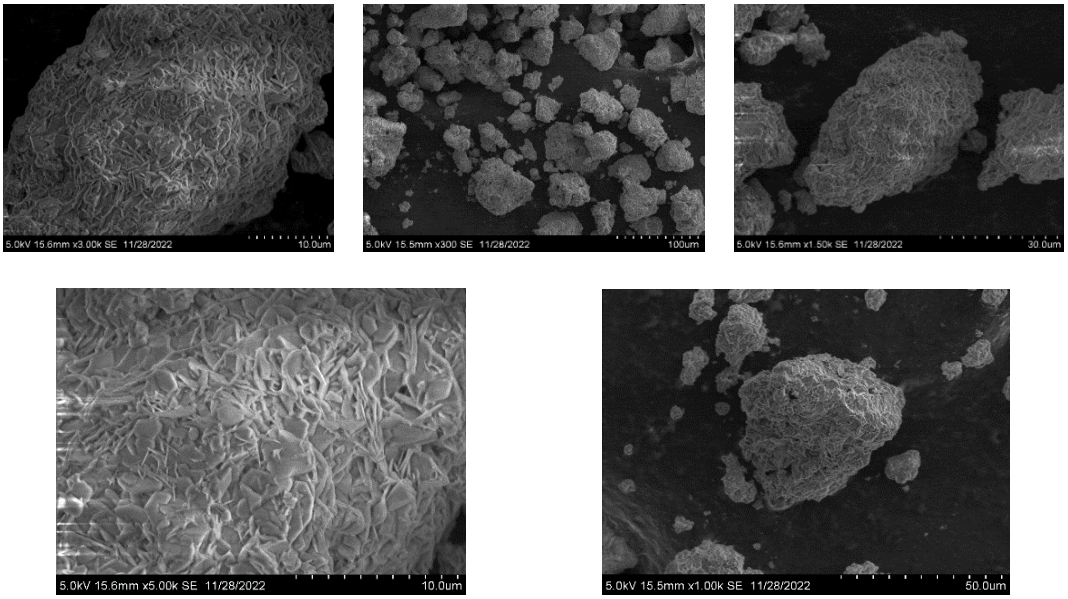
Sl. No.	Parameters	Result		
		A	B	C
1	Sodium as Na wt%	6.58	7.13	6.83
2	Potassium as K wt%	21.12	23.04	22.21

Table No. 6: Showing Discussion on Consolidated report of SEM – EDAX.

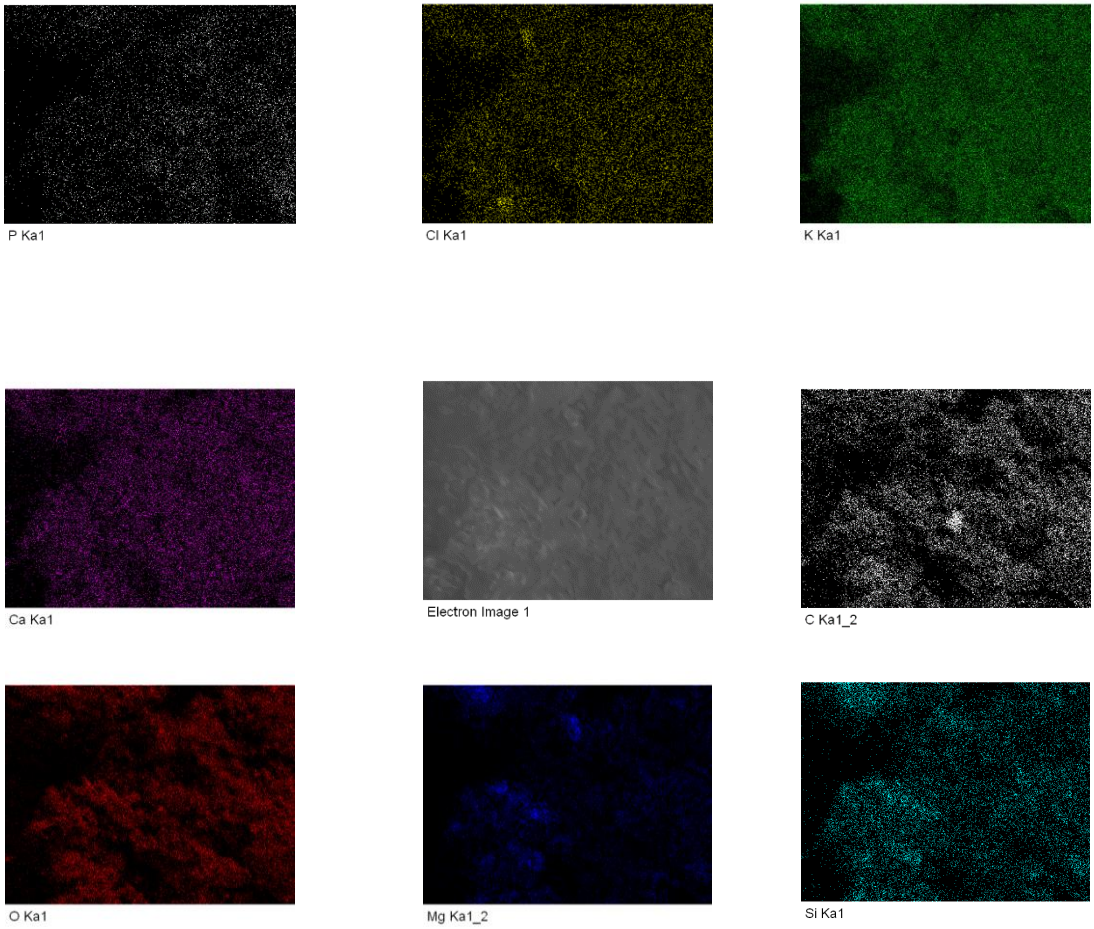
Sample	CK	OK	MgK	SiK	PK	ClK	KK	CaK
A	19.27	40.92	1.46	1.57	0.95	2.54	26.36	6.93
B	21.11	41.86	1.29	1.18	0.52	3.11	25.23	5.69
C	22.21	44.48	1.74	1.89	0.62	4.20	19.91	4.74



Showing Images and peaks of Sample –A



Showing Images of SEM Sample A



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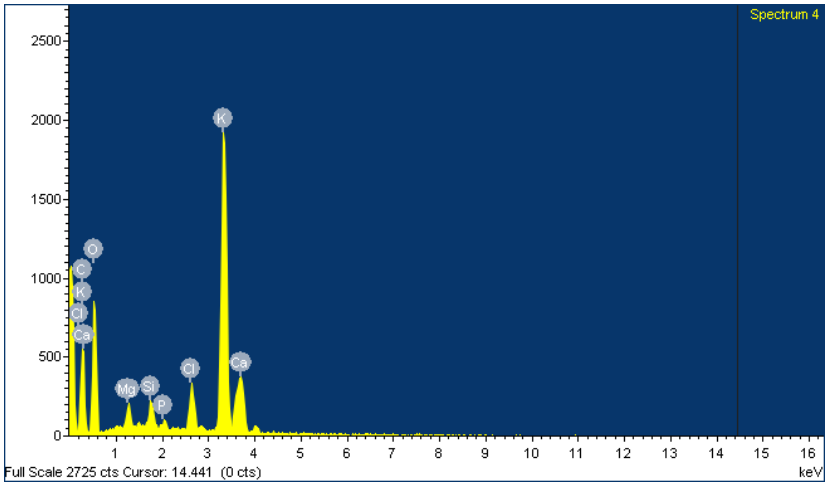
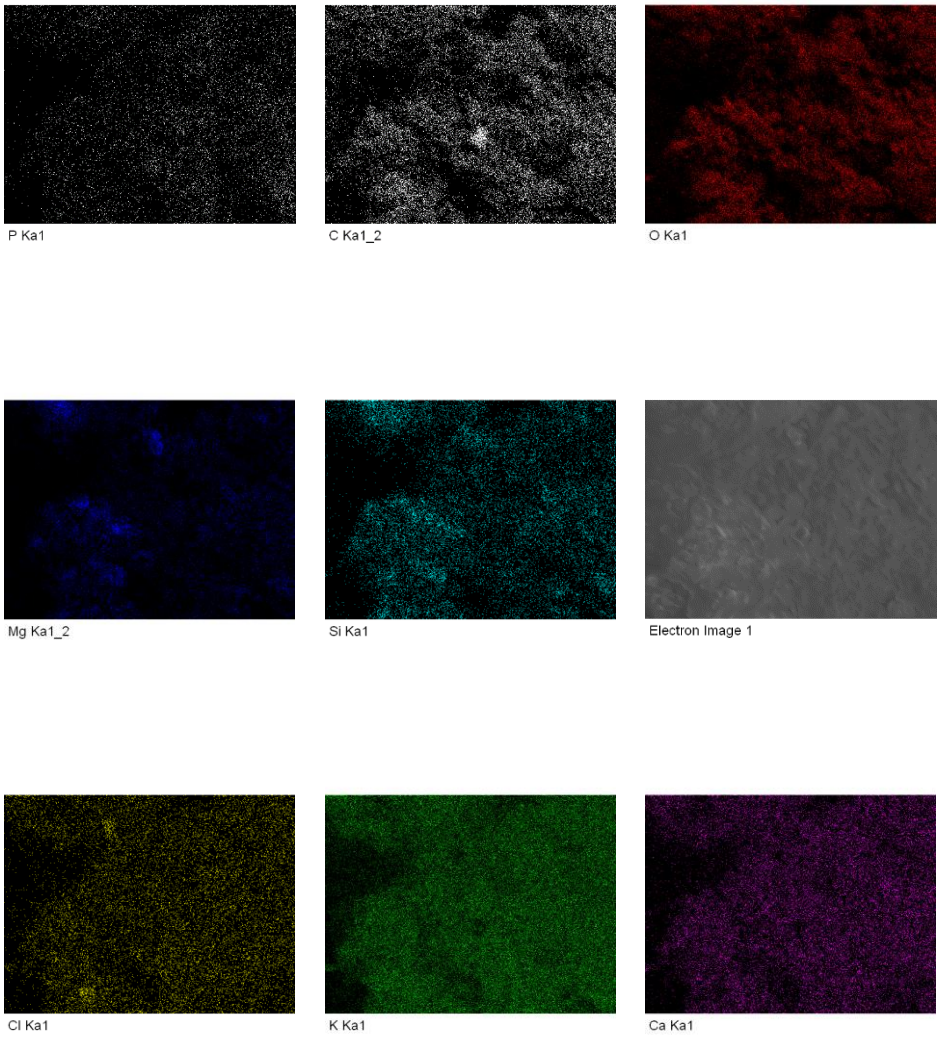
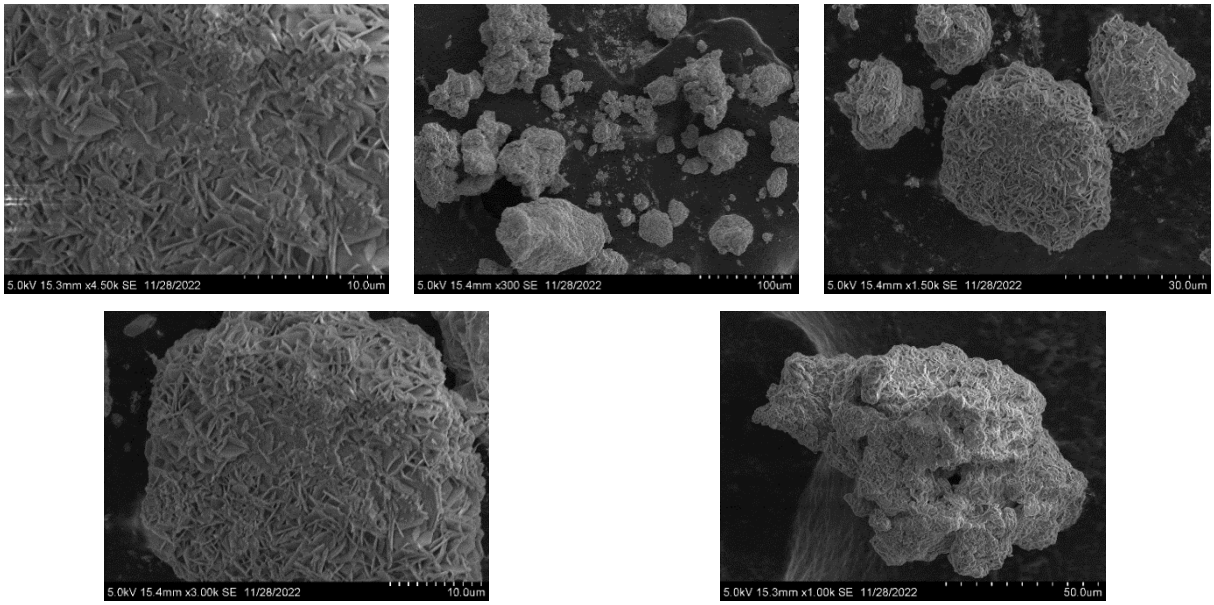


Showing images and peaks of Sample–B



Showing Images of EDAX Sample B



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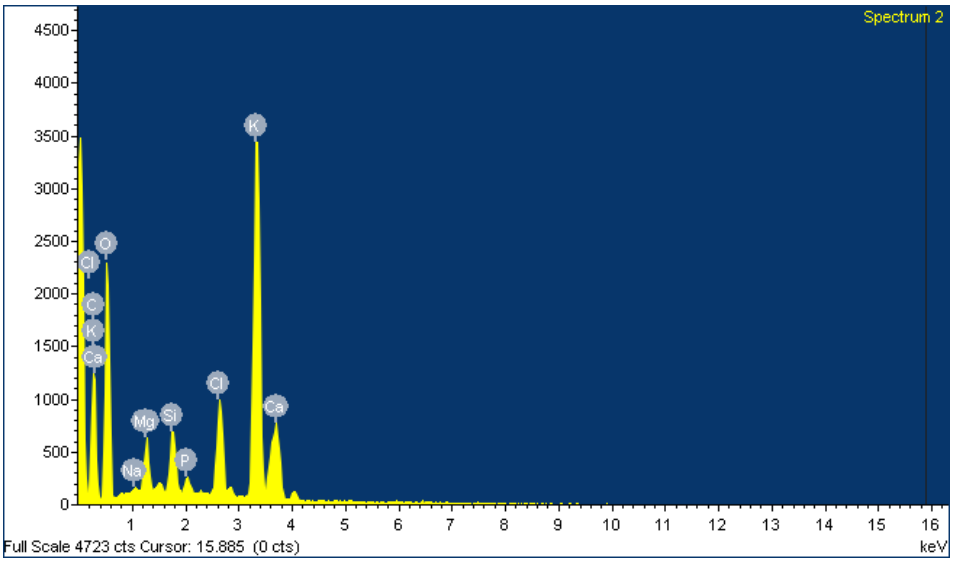
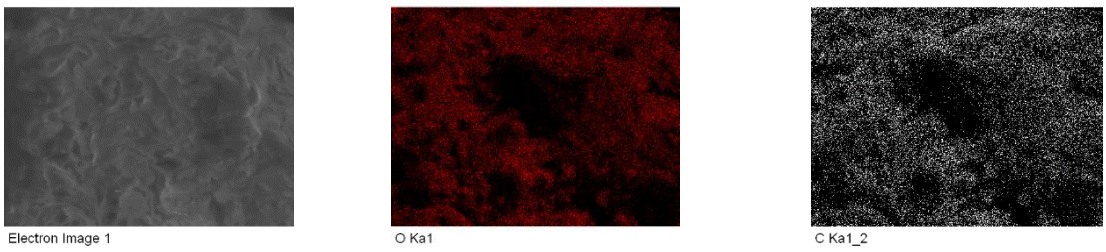
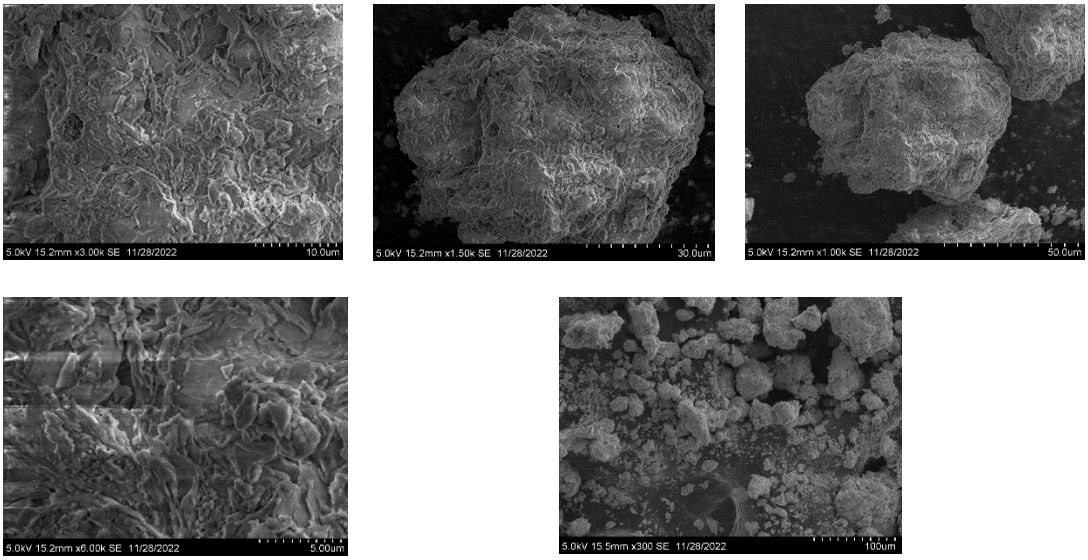


Showing images and peaks of Sample – C



Showing Images of EDAX Sample C



Showing Images of SEM Sample C

Collection of drugs

Collection of *Kadali Panchanga*

Drying of Drug

2nd day of drying


5th day of drying


35th day of drying

Test for perfectness of drying

Burning of Drug

Apparatus

Adding drug for burning

Burning

Completion of burning

Ash Collected

Preparation of *Kshara*

Taking ash in utensil

Adding of water

Peackock blue colour Ksharodaka

Filtration

Burning with double boiling method

Final product Kshara

Final Product Storage

DISCUSSION

- By Pharmaceutical study we can infer that Sample C has produced better yield (52% *Kshara*) followed by Sample A (50.69%) and Sample B (36.56 %) produced least yield.
- In analytical study Sample B has more water-soluble extractives followed by Sample C and Sample A.
- Alcohol soluble extractives slightly more in Sample A followed by Sample B and Sample C.
- Slight marginal increase of extractives is found in Sample B. However, difference between the samples is minimal.
- Electrolytes are more in Sample B followed by Sample C and Sample A as per flame photometry analysis.
- The EDAX reports showed almost similar concentration of the elements. Chloride is more in Sample C followed by Sample B and Sample A.

  Potassium and calcium are more in sample A followed by Sample B and Sample C.
- Difference of elemental concentration in 3 samples are minimal. Because of the varied concentration of the elements in different samples, it is difficult to say which sample of *Kadali Kshara* has better analytical values.

CONCLUSION

- As yield is more in Sample C, it is pharmaceutically beneficial.
- Overall analysis shows sample B has slightly better analytical values in few of the parameters, but in all the samples differences of analytical values are minimal.
- Hence Sample C is slightly advantageous process of *Kadali Kshara* making in comparison with Sample B and Sample A.

- Therefore, pharmaceutically the preparation method explained by *Sushrutha Samhita* can be considered as unique and ideal as per present study.

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