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Preliminary Phytochemical Evaluation of Arkakshara an Ayurvedic Alkaline Formulation

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ABSTRACT
Kshara(alkali) has corrosive, pungent, saline, acrid nature and possesses the ksharana (scraping) property. It is the alkaline substance of the plants, obtained by processing the ash of drugs. It is also called as anushastra (phyto alkali)by virtue of its chedanabhedanaguna.Kshara is prepared out of the dried plant ashes by a special process known as ksharakalpana.In kayachikitsa (General medicine) it is useful in treating diseases like kustha, gulmaand mutraghata. In shalya tantra (Surgical speciality) it has applicability in diseases like arsha (hemorrhoids), bhagandara (fistula) and nadivrana. Pratisaraniya (external use) and paneeya (internal use) kshara are the two types of kshara. The pratisaraniyakshara has been further sub classified according to its potential in to mridu (mild), madhya (moderate), and tikshna (intense)[7]. Kshara is having predominance of agni and vayubhuta. Further kshara has been classified on the basis of the number present in the group like dvikshara (two kshara), trikshara (three kshara), ksharapanchaka (five alkali) and ksharashtaka (eight alkali).Arka (calotropisprocera) is a drug known for its kshara properties and is included under ksharashtaka. In this work, Arkakshara was prepared as per standard references and subjected for analysis.The raw material selected for the study were of genuine quality and were comparable with API standards.Physicochemical characters of the study drug were within the pharmacopoeial limits.Pharmaceutical and analytical studies on Arkakshara could generate preliminary standards of study drug. The pH of the final product supports its alkaline nature and justifies its inclusion under ksharashtaka; a group of eight alkaline herbs. Microscopic studies of final product could be used for future references as a standard monograph.
Key words: Ksharashtaka, Arkakshara, preliminary standards.

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INTRODUCTION

The literary meaning of the word kshara is "substance which has corrosive, pungent, saline, acrid nature and possesses the ksharana property"[1]. Ksharana means "to mobilize" or "to remove" the deformed body tissue. It is the alkaline substance of the plants, obtained by processing the ash of drugs. It is also called as anushastra [1] by virtue of its chedanabhedanaguna. It's a derivative of plant drug ashes in the form of solutions, powder or crystals, all of which have the basic quality of being alkaline.Ksharais one among eighteen parts of herbal plants which can be used for medicinal purpose [2].

Kshara is a type of ayurvedic medicine which is prepared out of the dried plant ashes by a special process known as kshara kalpana [3]. The method of preparation of kshara have given higher pharmaceutical status to the dosage form. Therapeutically it has gained great importance in kayachikitsa and shalyachikitsa. In kayachikitsa it is useful in treating diseases like kustha, gulmamutraghata. In shalya tantra it has applicability in diseases like arsha, bhagandara and nadivrana [4]. It can be administered by a clever physician to rapidly cure even ailments of severe nature. It is said that the diseases which are difficult to treat can be cured by kshara therapy. Two types of kshara preparations i.e. Bahyaparimarjaniya (external use e.g. Ksharajala-alkaline water) and antah- parimarjaniya (which is prepared from burned drugs by antahdhuma method). It is interesting to note that kshara also contradict the ill effects of poisonous drugs (schedule e-1) as an antidote [5]. Above all kshara is also included as an ingredient in many formulations. So kshara is placed at top most place in all surgical and para- surgical measures [6].

Pratisaraniya (external use) and paneeya (internal use) kshara are the two types of kshara. The pratisaraniyakshara has been further sub classified according to its potential in to mridu (mild), madhya (moderate), and tikshna (intense) [7]. Kshara is having predominance of agni and vayubhuta. It possesses qualities like chhedana, bhedana, lekhana etc. So, kshara having lavana (salty), tikta (bitter) rasa; ruksha (dry), teekshnaguna (properties); ushna (hot) virya (potency); and katu (pungent) vipaka (attributes of drug assimilation) [8]. On the basis of origin; the arka are classified as vanaspatijanya (plant source), pranijaya (animal source) and khanijajanya (mineral source). Further kshara has been classified on the basis of the number present in the group like dvikshara, trikshara, ksharapanchaka and ksharashtaka. This classification includes group of alkaline materials with similar guna and karma [9]. Arka (*Calotropis procera*) is a drug known for its kshara properties and is included under ksharashtaka [10, 11, 12].

Arka (*Calotropis procera* (ait.) R. Br.) Belongs to asclepiadaceae family and found wild more or less throughout india. It is called ravi, bhanu and tapana in sanskrit, madar tree in english, aak, madar, akavana in hindi and ekka, ekkadagida, ekkegida in kannada [13]. Morphological features include rough, fissured, corky and soft roots, externally yellowish-grey while internally white. The bark can be easily separated from xylem. Leaves are sub-sessile, 6-15 cm by 4.5-8 cm, broadly ovate or ovate-oblong pubescent when young and glabrous on both sides on maturity. The plant has characteristic odour, bitter and acrid taste [14]. Arka plant with foreign matter not more than 2%, total ash not more than 21%, acid insoluble ash not more than 5% and water soluble extractive of not more than 24% are considered more suitable for pharmaceutical and therapeutic purposes [15]. calotropin is the major glycoside present in arka [16].

All medicines, whether synthetic or of plant origin, should fulfill the basic requirements of being safe and effective. Standardization is way of achieving it with the help of standards of characteristics, constant parameters, and definite qualitative and quantitative values [17]. In this work an attempt is made prepare and analyse Arkakshara.

MATERIAL AND METHODS

The methodology followed in this work had two important steps. In first step kshara was prepared from dried panchanga of arka which is explained as pharmaceutical work. In the second step the prepared kshara were analysed for their physico-chemical characters which is explained as in analytical work.

I . Pharmaceutical work:

Panchanga (Five parts of a plant) namely leaves, root, stem, flowers and fruits of arka plant were collected and were authenticated from dept of Dravyaguna, sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital Hassan. Preparation of kshara from dried panchanga of arka plant was carried at Dept of Rasashastra and Bhaishajyakalpana, Sri Dharmasthala Manjunatheshwara College of Ayurveda &Hospital Hassan. The general method of preparation of kshara was followed for preparation of arkakshara.

First panchanga of drug is collected & dried properly in sun light. 10 kg of drug was taken and completely burnt in to ashes. After cooling the ash was collected and weighed. The ash was then dissolved in 6 times quantity of water v/v. Mixture is stirred well & kept undisturbed overnight. Next morning, supernatant fluid is collected and filtered for 21 times. The clear liquid (ksharodaka) was collected in a clean wide mouthed iron vessel. The ksharodaka was then boiled in an iron vessel and stirred constantly to get dry powder. The white colour edkshara was obtained.

II Analytical Work:

The analytical work was carried out at Sri Dharmasthala Manjunatheshwara Center for Research in Ayurveda and Allied Sciences, Udupi. The procedure specified in protocol for testing Ayurveda drugs published by CCRAS was followed for analytical work [18]. The details of procedures carried out are as follows:

1. Powder microscopy: A pinch of the sample was mounted on a microscopic slide with a drop of glycerin-water. Characters were observed using using Zeiss AXIO trinocular microscope attached with Zeiss AxioCam camera under bright field light. Magnifications of the figures are indicated by the pre-calibrated scale-bars using Zeiss Axio Vision software.
2. Total Ash: 2 g of sample was incinerated in a tared platinum crucible at temperature not exceeding 450˚C until carbon free ash is obtained. Percentage of ash was calculated with reference to weight of the sample.
3. Acid insoluble Ash: To the crucible containing total ash, add 25ml of dilute HCl. Collect the insoluble matter on ashless filter paper (Whatmann 41) and wash with hot water until the filtrate is neutral. Transfer the filter paper containing the insoluble matter to the original crucible, dry on a hot plate and ignite to constant weight. Allow the residue to cool in suitable desiccator for 30 mins and weigh without delay. Calculate the content of acid insoluble ash with reference to the air dried drug.

4. Water soluble ash: Boil the ash for 5 min with 25 ml of water; collect insoluble matter on an ashless filter paper, wash with hot water, and ignite for 15 min at a temperature not exceeding 450°C. Subtract the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water soluble ash with reference to the air-dried sample.
5. Determination of pH:Taken 1 g of sample. 10 ml of distilled water was added, stirred well and filtered. The filtrate was used for the experiment. Instrument was switched on. 30 minutes time was given for warming pH meter. The pH 4 solution was first introduced and the pH adjusted by using the knob to 4.02 for room temperature 30°C. The pH 7 solution was introduced and the pH meter adjusted to 7 by using the knob. Introduced the pH 9.2 solution and checked the pH reading without adjusting the knob. Then the sample solution was introduced and reading was noted. Repeated the test four times and the average reading were taken as result

RESULTS AND DISCUSSION

The data collected at different steps like collection of raw drugs, authentication, pharmaceutical and analytical works are given table 1 to 5.

Physicochemical characters of the study drug were within the pharmacopeial limits [14, 19] (Table 1). This observation is supportive of quality of raw drug used in the preparation. Loss of 2.250 kg of weight (Table 3) after drying indicates that almost 18% moisture was present in the drug. Weight of ash obtained in the present study was only 5% (Table 3) which may reflect in the cost of the final product. Arka ash was in powder form and grey in colour after complete burning (Table 2). This may be due to complete burning of drug without leaving behind unburnt traces. The odour was characteristics and the taste of ash was salty, the alkalinity may be the reason.

The ph the kshara was 10.49 in this work(Table 4). Earlier studies have recorded a ph of 10.56 to 11.01 [20, 22]. The presence of potassium compounds attributes to high alkalinity [23, 24]. The acidity or alkalinity of a product has a profound influence on the decomposition of drug [25]. If it is very acidic or less alkaline there will be more decomposition of the drug. When the pH is low, the product readily gets oxidized. This indicates that pH of arkakshara may influence positively on the stability and shelf life of finished product.

Total ash in the final product of arkakshara indicates that there were almost 91.3% of constituents rather of alkaline nature(Table 4). The procedure of heating the kshara at a temperature of 450˚c until carbon free material is obtained removes possible organic materials present in the product [26]. Studies on apamargakshara have shown a total ash ranging from 94.08 to 96.55 at different experiments [20-22]. This reiterates the alkalinity and in comparison, to arkakshara is in higher range.

Acid insoluble ash is a usual test carried out to evaluate the percentage of insoluble inorganic content of the sample in dilute acid [27]. As all the substances taken orally pass through a phase of digestion in hydrochloric acid this test has a therapeutic significance. Kshara is prepared by dissolving this ash in water and after filtering dried by the heat, in this process, an insoluble substance like silica is being separated by the filtration and soluble substances like potassium and sodium remain in the solution. In the final product of arkakshara however there was only 0.09% of acid insoluble ash(Table 4).

Water soluble ash indicates the percentage of solubility of contents of the sample soluble in water. In the present work it was 89.65% indicating almost all contents of final product were soluble in water(Table 4). There is no surprise in this observation as the method of preparation itself is dehydration of water-soluble principles after repeated filtration.

Microscopic studies of final product showed crystal mass, brown content and uneven shaped crystals(Figure 1). The plates of microscopic studies can be used for further references as standard monograph.

Table 1: Physico-chemical characters of drug:

Parameter	Observed value	Value as per API
Total ash	3.28	Not more than 4 %
Acid insoluble ash	0.29	Not more than 1%
Water soluble ash	2.07	Not less than 2%

Table 2: Organoleptic characters of Arka ash & Ksharodaka

Parameters	Arka ash	Ksharodaka
Colour	Whitish grey	Greyish black
Odour	Characteristic	Characteristic
Taste	Salty	Salty
Appearance	Powder	Viscous Liquid

Table 3: Pharmaceutical data of Arkakshara

Weight of fresh Arkapanchanga collected	12.5 kg
Weight of dried Arkapanchanga	10.250 kg
Loss in weight after drying	2.250 kg
Percentage of loss after drying	18%
Number of days required for drying	12
Total weight of ash obtained after burning the dried panchanga	500 g
Loss in weight	9500 g
Percentage of ash when compared with dried panchanga	5%
Percentage of ash when compared with fresh panchanga	4%
Weight of kshara obtained	30 g
Percentage of kshara when compared with ash	6%
Percentage of kshara when compared with fresh panchanga	0.24%
Number of days required for kshara preparation after complete drying of drug	4

Table 4: Physico-chemical parameters of kshara

pH	10.49
Total ash	91.3
Acid insoluble ash	0.09
Water soluble ash	89.65

Table 5: Ash obtained and final quantity of Kshara obtained:

Sl	Name of drug	Quantity of raw drug taken	Ash obtained	Kshara obtained
1	Arka	10 kg	500 g	30 g

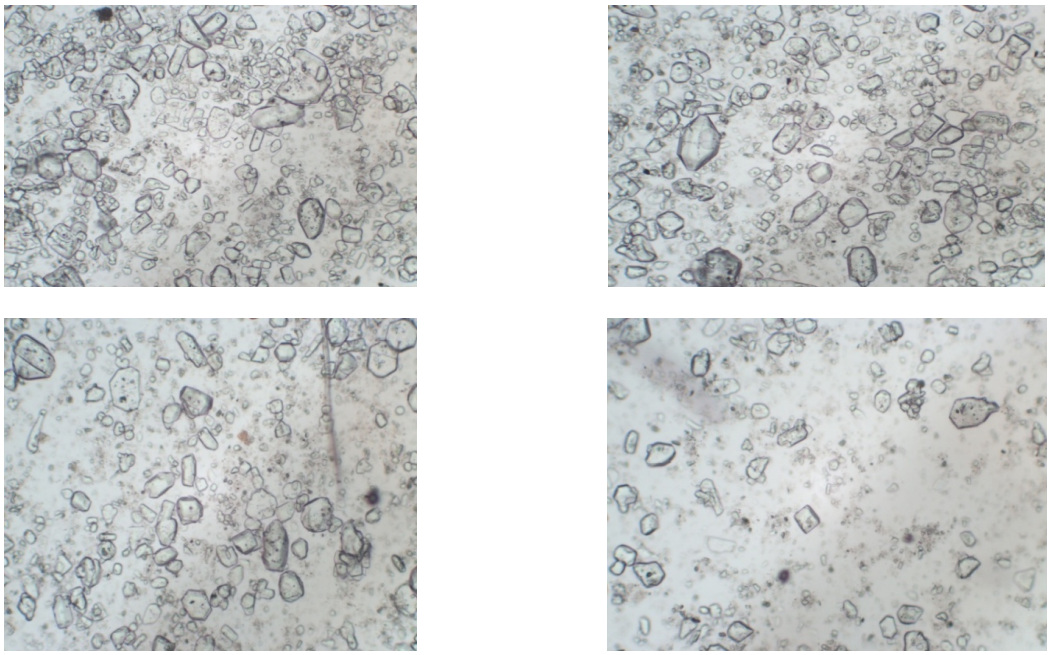

Figure 1: Powder microscopy of Arkakshara.

CONCLUSION

This work on preliminary pharmaceutical and analytical studies on arkakshara could generate preliminary standards of study drug. The raw material selected for the study were of genuine quality and were comparable with API standards. The pH of the final product supports its alkaline nature and justifies its inclusion under ksharashtaka; a group of eight alkaline herbs. Microscopic studies of final product could be used for future references as a standard monograph.

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CONFLICT OF INTEREST:

None

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