



Research Article

PHARMACEUTICO-ANALYTICAL STUDY OF TAMBOOLA ARKA

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ABSTRACT

Arka Kalpana is a distinctive Ayurvedic pharmaceutical preparation in which the active principles and volatile components of a drug are extracted with the help of *Arka yantra* or another practical modern distillation apparatus. *Tamboola Arka* is a preparation mentioned in third *Shataka* of *Arka Prakasha*. It has properties to cure the *Mukha dourgandhya*, *Mala*, *Vata* and *Srama nashana*. *Tamboola pathra* has *Katu*, *Tikta*, *Kashaya rasa* and *Laghu*, *Tikshna* *Vishada gunas* by which it can be used to control the diseases which occur inside the mouth. Since it is an *Arka* preparation it has got several benefits like shelf life and is also user friendly. No previous works have been carried out on *Tamboola Arka*. So in this study *Tamboola Arka* was prepared and organoleptic and physico-chemical parameters were tested. GCMS (Gas Chromatography and Mass Spectrometry) was also conducted to identify the various components and their concentrations.

INTRODUCTION

Arka is one among the *Panchavidha Kashaya Kalpana* mentioned by Ravana. It is the most potent and *Sreshta Kalpana* according to *Arkaprakasa*^[1]. The method by which volatile oils and water-soluble active principles of drugs are collected is called as *Arka Kalpana* and the product thus obtained is called *Arka*. API Part II, Vol 3, it is described as "*Arka* is a liquid preparation obtained by distillation of certain liquids or drugs soaked in water using the *Arkayantra* or any convenient modern distillation apparatus"^[2]. *Arka* is equivalent to the Aque or 'Waters' of the western pharmacopoeia. The properties of *Tamboola Arka* are mentioned in *Tritiya Sataka* of *Arka Prakasha*. It contains only one ingredient which is *Tamboola pathra* (leaves of *Piper betle*). It can cure *Dourgandhya* of mouth, *Mala* present in the mouth and *Srama*^[3]. *Tamboola* (*Piper betle*) belongs to Piperaceae family. *Tamboola* has *Katu*, *Tikta*, *Kashaya rasa* *Laghu*, *Sara*, *Tiksna*, *Vishada guna*, *Usna veerya* and *Katu vipaka*. It can alleviate the *Kapha* and *Vata doshas* in the body^[4].

With its extended shelf life, *Arka Kalpana* may be kept fresher for longer periods of time. It is also more palatable and need a lower dosage for internal administration, in contrast to alternative dose forms such as *Kwatha*. In this preparation, the drug's volatile oil is obtained. These benefits have led to the rise in popularity of *Arka kalpana* in the contemporary day^[5]. The aim of the study was to prepare *Tamboola Arka* and to conduct organoleptic evaluation and physico-chemical tests.

MATERIALS AND METHODS

Pharmaceutical Research: The research on pharmaceuticals began with the acquisition of authentic raw materials, which were then pre-processed and ultimately converted to the product: *Tamboola Arka*.

Ingredients: *Tamboola arka* consist of only one ingredient which is *Tamboola pathra*.

Collection of Raw Drugs: *Tamboola pathra* was collected from authorized dealers in Thiruvananthapuram.

Preparation of Tamboola arka: Fresh *Tamboola pathra* were washed well. As per the method of preparation of *Arka* described in Ayurveda *Sara Sangraha*^[6], one part of drug was soaked in eight times of water and was kept for overnight. 100gm of *Tamboola pathra* was taken. Then it was cut into small pieces of about 2cm in length using a pair of scissors. Then it was transferred into round bottom flask and

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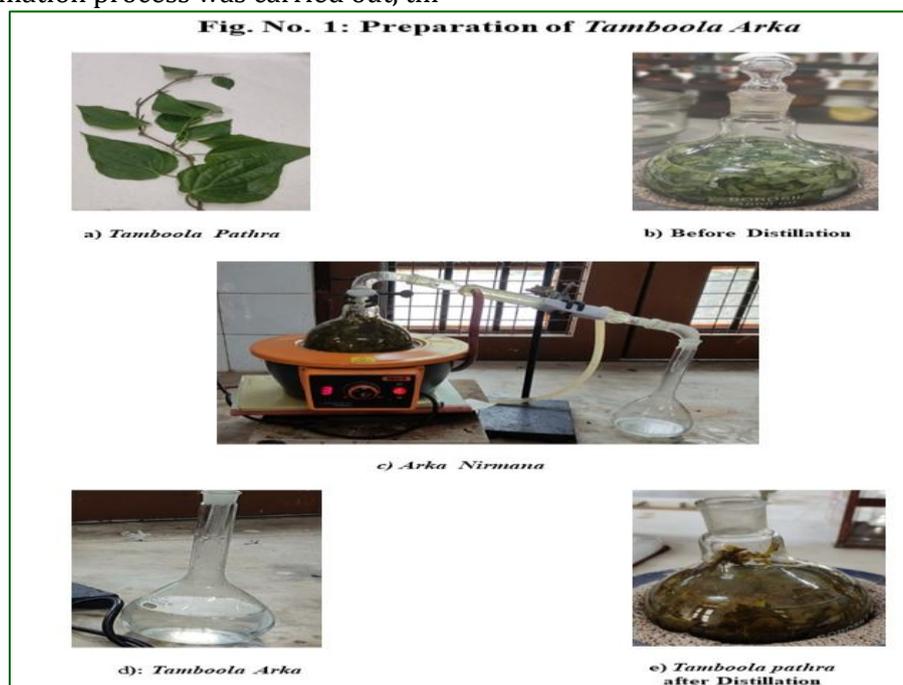
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added 800ml of water into it. Its mouth was covered and kept undisturbed overnight.

On the next day morning, the round bottom flask was kept on heating mantle. All other parts were assembled carefully. The capacity of the round bottom flask was 1000ml. The fire should always be kept minimum. Then distillation process was carried out, till

50% (400ml) of the distillate was collected in the collecting flask. The *Arka* collected was stored in sterile airtight glass bottle. 4 litres of *Arka* were prepared from 2.2kg of fresh leaves of *Tamboola* from 11 batches. The *Arka* obtained was a clear liquid. It had a pleasant smell characteristic of the ingredients.



Analytical Study

Study Setting: Drug Standardisation Unit and Drug Testing Laboratory, Government Ayurveda College Thiruvananthapuram. Central Instruments Laboratory, CoVAS, Mannuthy.

Organoleptic Evaluation of *Tamboola Arka*:

Organoleptic characters like appearance, taste, colour and odour were assessed. Physico-chemical parameters like pH, specific gravity, viscosity, total suspended solids, refractive index and volatile oil estimation were done for *Tamboola arka*.

Determination of pH: pH of a drug is defined as the negative logarithm of the concentration of H⁺ ions which it contains $\text{pH} = -\log(\text{H}^+)$. Product of H⁺ ions and OH⁻ ions is a constant = 1×10^{-14} at 25°C.

The acidity and alkalinity depend upon which of the ions present in greater concentration than other. The pH value of the samples can be determined by using pH indicator paper or pH meter. The pH was determined by using pH meter by dipping the electrodes in a beaker containing sample and reading was noted [7].

Determination of Specific gravity: Specific gravity of a substance is the weight of a given volume of that substance at a stated temperature as compared with the weight of an equal volume of water at the same temperature, all weights being taken in air [8].

Determination of Refractive index: The refractive index of a substance with reference to air is the ratio of the sine of the angle of refraction of a beam of light passing from air into the substance. It varies with wavelength of the light used in its measurement. Abbe's refractometer is convenient for most measurements of refractive index [9].

Determination of Volatile oil estimation: Volatile oil estimation was done using Clevenger's apparatus where volume of the oil collected on the surface of water in the graduated tube was measured and the volatile oil content expressed as a percentage v/w [10].

Method

Specific gravity is calculated by using a specific gravity bottle. A clean dry specific gravity bottle was weighed accurately. It is filled with distilled water and closed with its lid. Wipe the water on the surface of the bottle with a filter paper. Weight of bottle with water was taken. After emptying the bottle, the same process is repeated by filling the required sample and its weight was measured. From this specific gravity was calculated as

$$\text{Specific gravity of the sample} = \frac{\text{Weight of Sample}}{\text{Weight of Water}}$$

Determination of Total suspended solids: 30ml of the sample was taken in a pre-weighed dried China dish for the calculation of total suspended solids.

Content was evaporated to dryness on a water bath and dried at 105°C for 3 hours in a hot air oven then the dish with residue was kept in desiccators for 30 minutes to cool and it was weighed. Final weight of residue should comply with the requirements stated under the individual monograph. All these procedures were repeated thrice and average value was calculated and noted [11].

Gas Chromatography and Mass Spectrometry

GCMS: Gas chromatography (GC) is a chromatographic separation technique based on the difference in distribution of species between two non-miscible phases in which the mobile phase is a carrier gas moving or passing the stationary phase contained in a column. It is applicable to substances or their derivatives, which are volatilized under the temperatures employed is based on mechanisms of adsorption, mass distribution or size exclusion.

Apparatus: The apparatus consists of an injector, a chromatographic column contained in an oven, a detector and data acquisition system (or an integrator or a chart recorder). The carrier gas flows through the column at controlled rate or pressure and then through the detector. [12]

Sample Preparation: 15ml of the sample of is added with a pinch of anhydrous magnesium sulphate and anhydrous sodium acetate. Shake vigorously by hand

for 1 minute. Then mix it with 15ml of acetonitrile and centrifuge at 5000 RPM for 10 minutes. As a result, phase separation of water occurs. Then filtration is done with 0.2mm syringe filter. Then it is loaded for the process of Gas Chromatography Mass Spectrometry.

GCMS Profiling Method: The Gas Chromatography-Mass Spectrometry (GC-MS) analysis was conducted using M/S Shimadzu GC-MS Model Number: QP2010S (Software: GCMS Solutions equipped with ELITE-SMS Capillary column (30 mx 0.25 mm ID, 0.25 um thickness).

OBSERVATION AND RESULTS

Organoleptic evaluation of *Tamboola Arka*

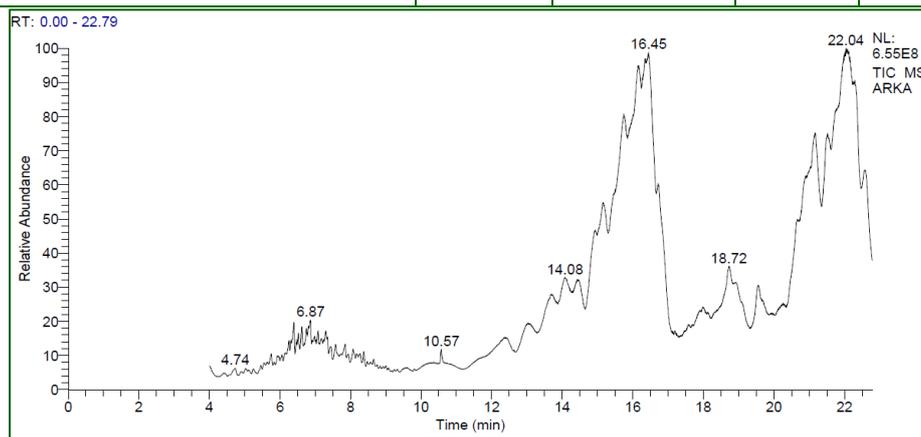
- Colour- Colourless
- Odour- Aromatic odour
- Taste- Slight pungent taste
- Appearance- Clear liquid

Results of physicochemical tests done were as follows

- pH of *Tamboola Arka* - 4.14
- Specific gravity- 0.915
- Refractive index- 1.33
- Volatile matter- 0.03%
- Total suspended solids- 0.003 mg/l

Table 1: Observations of GCMS

Peak	Compound Name	RT	Probability	Area %	Molecular Weight
1	Lup20-(29)-en-3-ol, acetate, (3a) 9, 19Cyclolanost24en3ol	4.74	65.86	0.23	468
2	Lup20-(29)-en-3-ol, acetate, (3a) -13	6.87	73.52	1.58	468
3	Phenol	10.57	24.27	0.45	164
4	Lup20-(29)-en-3-ol, acetate, (3a) 13, 27Cycloursan3ol	14.08	67.13	1.89	468
5	Lup20-(29)-en-3-ol, acetate, (3a)12-Oleanen-3yl-acetate,	16.45	62.19	15.20	468
6	Lanosta-8,24-dien-3-ol, acetate	18.72	78.25	1.92	468
7	Lup-20-(29)-en-3-ol, acetate	22.04	79.02	9.05	468



Graph 1: GCMS profiling of *Tamboola Arka*

DISCUSSION

Tamboola pathra for the preparation of *Tamboola arka* was procured from authorized dealers in Trivandrum. The method of preparation of *Tamboola arka* was done as per Ayurveda Sara Sangraha. One part of drug was soaked in eight times of water for overnight (16 hours) then distillation was done using distillation apparatus. After one hour of distillation *Arka* started coming out of the outlet of distillation apparatus. 100gm of *Tamboola pathra* with 800ml of water was used for the preparation. The heat should always be kept minimum. Then distillation process was carried out, till 50% (400ml) of the distillate was collected in the collecting flask. The method of preparation of *Arka* was by distillation. Distillation works similarly to aqueous extraction, as demonstrated by *Kashaya Kalpanas*. The volatile principles are maintained in this preparation process, which is an added benefit of *Arka kalpana*. It is more pleasant, more durable, and user-friendly.

The pH, specific gravity, volatile matter and GCMS of *Tamboola arka* were determined as part of the study. The pH value can be used to determine whether the sample is acidic or alkaline. The pH of the sample was 4.14 which indicate that the sample is acidic.

Specific gravity compares the density of the sample with the density of water. The specific gravity of *Tamboola Arka* is 0.915. This value is near to one which suggests that specific gravity. The refractive index of 1.33 suggests the low density and viscosity of the sample. The volatile oil present in the sample was determined by using Clevenger apparatus and it was noted as 0.03%. The volatile matter percentage indicates the concentration of volatile oil in the medication as well as the index of gaseous matter that is present in the material. The total suspended solids present was 0.003. It has a lower value because it is a water distillate and only contains water soluble active principles in addition to volatile principles that were extracted from the raw medication.

A modified method called gas chromatography can be used to both evaluate and separate volatile molecules from organic or inorganic substances. The report of GCMS study of *Tamboola arka* conveyed that there are 7 multiple volatile compounds observed. The highest peaks were obtained at 22.04 and 18.72 which corresponds to compounds Lup-20-(29)-en-3-ol, acetate and Lanosta8, 24-dien-3-ol, respectively maximum area of the graph which depict the highest concentration in the *Tamboola arka* sample.

CONCLUSION

In this study the pharmaceutico analytical study of *Tamboola arka* was conducted. *Tamboola arka* contains only one ingredient which is *Tamboola pathra*. The leaves of *Tamboola* were cut into small

pieces and dipped in water and kept overnight to aid in proper extraction. The yield obtained was 50%. The analytical studies conducted help to determine preliminary standards for *Tamboola arka* as no previous works are available.

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