



## National Journal of Research in Ayurved Science

### Standardization of Arka Kalpana- A Review.

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#### Abstract:

India have a rich heritage of traditional medicinal system from centuries. Ayurveda is a boon for us given by this rich cultured heritage. We use various forms of medicine either traditional ayurvedic formulations (Panchavidhakashay kalpana, asava , arishta, pottali kalpana etc) or modern formulations (syrups, capsules, soft gel capsules, drop formulations etc) in day to day practice. Some formulations explained in Ayurvedic texts lag behind either due to lack of appropriate study or these formulations are not used widely. One of such formulation is Arka kalpana. 'Arka kalpana' is explained in details by author Ravana in the text 'Arkaprakash'. Here it will be explored in details and its standardization techniques will be elaborated . Drug standardization means to

confirm its identity, quality and purity throughout all phases like drug collection, processing, storage, distribution etc.

Standardization of Arka kalpana can be done in three stages – Raw material standardization, process standardization and finished product standardization. The outcome of Standardization of Arka kalpana is that a quality, potent, effective formulation of medicine will be available in market with better patient compliance which is need of the hour.

**KEY WORDS:** Arka kalpana, Standardization.

#### Introduction

Today its very pleasant hearing that Ayurveda is spreading its root at international levels. People are accepting the importance of Ayurveda, its treatment

protocols and its usefulness in era of critical illness including life style disorders. No need of explaining the importance of 'Standardization' where Ayurveda is establishing itself in an international market. Every step of Ayurved drug manufacturing needs standardization right from raw material standardization to finished product standardization. This ensures quality and purity of the drug manufactured. Some formulations are little bit unexplored in Ayurveda one of it is —**Arka Kalpana**. Here a detailed review is taken on Standardization aspects of Arka Kalpana.

Detailed explanation of Arka formulation is found in text written by author Ravana in his text named as 'Arkaprakash.' The 'Arka Kalpana' first of all was described by Shodhal in 12th century. After that arka was used extensively and many books were written on it. According to API; Arka- is a liquid preparation obtained by distillation of certain liquids or drugs soaked in water using Arkapatan yantra or any convenient modern distillation apparatus. In Bhaishjyakalpana stream of Ayurveda we all are well acquainted with Panchavidhkasahy kalpana (Swaras, kalka, kwath, hima and phant.), but Ravana has explained Panchvidhkashay kalpana as - Kalka, Churna, Swaras,, Taila and Arka , where in his literature he says that Arka is more effective than any other kalpana. While explain characteristics if Arka he says that with combination of drugs with each other, we can prepare area of sand particles or and other heavy drugs too.

Hence we can say according to him, 'n' no of permutations and combinations can be made to form any desired Arka we want. These arka can be used as medicines as well as anupana for disease treatment. Arkaprakash text explains nearly about 388 no of Arka as single or compound drug formulation. Lets study the Standaradization aspects of Arka kalpana in details.

### **Aims and Objectives:**

To review on the standardization aspects of Arka kalpana.

### **Materials and Methods:**

The raw materials required for preparation of any Arka need to be authenticated as it is the basic tool to treat the disease, medicine procured should be of good quality, high potency and safe. Following CCRAS Guidelines must be followed while raw material standardization before preparaing Arka kalpana.

- Identification (Microscopic and Macroscopic characters, Powder microscopy)
- Physical parameter (Adulteration, Foreign matter, loss of drying, Organoleptic characters, Ph)
- Chemical parameter (Total ash, acid insoluble ash, water soluble extractive, alcohol soluble extractive)
- Chromatographic analysis, (TLC,HPTLC, GLC,HPLC)
- Biological parameters. (Assay for

active constituents, test for heavy metals/toxicity, Pesticide residue, microbial contamination)

## Methods:

Preparation and standardization of Arka can be studied in both ways classical as well as modern methods.

### ➤ Method of Arka preparation according to Arkaprakash:

There is vast explanation for preparation of Arkas in text of Arkaprakash gives detailed information right from collection and preparation of equipments required for arka preparation, upto how to remove durgandhi from Arka if any. We can divide these steps into following categories—

- Apparatus used in Arka preparation
- Process of Arka preparation(Methodology)
- Role of Agni in Arka preparation.

### 1. Apparatus used in Arka preparation:

- **Mud:** Details of mud used for preparing Arkapatan yantra is as below- The mud should consist of loha churna (iron powder), gairik, alum, bhrushta mrittika, red clay, bone powder, glass powder, kaseesa etc. All should be taken in equal quantities and should be mixed with equal quantity of cow's urine, horse, buffalo, goat and elephants

urine(panchamutras). It should be dried in sunlight till all smell of urine goes off and then this clay is used in preparation of apparatus (Arkapatan yantra).

- **Characteristic of Arkapatan yantra-** Using above mud the round shaped vessel is made whose mouth should not be less than 3 Angula with shape of Surya mandala. Same sized lid to cover the pots mouth with lips of 3 angula. Jeernasthi mrittika is used to seal edges to make the apparatus air-tight. A Bamboo tube one small another double of 1st is inserted in the pot ( 4-5 angula inside and sealed with clay). Arka patra is kept below large tube which is kept in cold water. Fumes coming out of pot are condensed and collected in this vessel.

Arkaprakash also explains type of wood to be used for burning- It should be dry but heavy, which can easily fit in ones fist(size). E.g Khadir tree bark, or babbul tree bark

- Patra for Arka grahan- It should be made up of Jirnasthi mrittika patra, or glassware or stoneware or earthen vessel should be used. All these specifications can be called as Standard apparatus needed for Arka patana.

### 2. Process of Arka preparation(Methodology)

Arkaprakash explains various method of Arka preparation according to consistency

of drug and type of drug. But the basic principle of urdhvapatan remains same in all types of dravyas only there is

difference in water quantity and duration of soaking.

Type of Drug	Water for soaking	Example of drug	Duration of soaking
Atyanta Kathina	3 parts	Chandana	Initially only 2 parts of water is added after that remaining is added and kept 8 prahar in sunlight and moonlight
Kathina dravya	2 parts	Trikatu, Ajmoda	8 prahar in sunlight and 8 prahar in moonlight
Saras Adra dravya	1/20 th	Dhatura	1 muhurta (2 ghadi)
			heat is given
Niras Adra dravya	1/20 <sup>th</sup>	Vat, Ashwatha	Soaking for 1 prahar
Sadughdha mrodu	4 parts	Arka, Dughdhika	-
Sadughdha Tikshna	10 parts if dughdha is not seen after soaking	Satala, Sehund	3 days initially keep in water.
Patra(leaf)	1/100 <sup>th</sup> part	Any type like Vasa etc	Keep for 1 ghadi in sunlight
Mrudu Saras phal (fruit)	-	Amra	-
Atipakva Saras phal	-	-	-
Pushpa (flower)	1/16 <sup>th</sup> part of water	Gulab	3 hours

Kashtha Aushadh	1/80 th part of water	Mango, Audumbar	Coarsely powdered and then 4 times Saindhav and Sajjikshar is added
Katphaladi kashtha	1/40 th part of water.	Kaiphall	Wash several times
Drava Dravya	--	Gomutra	-

Mamnsa Arka- Likewise according to type of Mamnsa, SOP of arka preparation is mentioned with different combination. (Kathina mamnsa, Ghana mamnsa, Mrudu mamnsa). In the same way Arka prepared from anna dravya becomes 6 types of Agni is explained in the text as below-

Madya. Different kinds of Madya are mentioned.

### **3. Role of Agni in Arka preparation:**

Agni type	Characteristic
1. Dhumagni	Without flames, there are huge fumes
2. Deepagni	Flame of Dhumagni is increased 2 to 4 times
3. Mandagni	Flame of Deepagni is increased 4 times
4. Madhyamagni	Agni in which flame is in between deepagni and mandagni
5. Kharagni	5 <sup>th</sup> part of complete agni, used for all purposes
6. Bhatagni	Agni in which flame spreads all over the bottom of the vessel.

Also according to duration of heat given, Arka nisaran agni kala is mentioned which is of 4 types—

1. Sardha yama-(1 ½ prahar)-4.30 hrs
2. Yama—(1 prahar)—3 hrs
3. Yamardha-(1/2 prahar) –1.30

hrs

4. Muhurta-(2 ghati)—48 mins

The arka prepared in 1 prahar is called Nyun Arka, the one prepared in 2 prahar is called madhyam arka, and the one prepared in 3 prahar is called Shreshtha Arka.

Dhupan karma is explained in details when an arka gets an unpleasant odour

this vidhi is called as ‘ Durgandhi nashan karma’.

In this whatever procedures are explained in the text are the SOP mentioned for preparation of an quality Arka. We won't find this much details now a days for other kalpas or formulations. It's a readymade data given, following which a quality product can be obtained.

➤ **Method of Arka preparation according to modern methods:**

In modern aspects Arka nirman is compared with Distillation process.

Distillation is the process by which liquid is vapoursied and recollected by cooling and condensing the vapour. It can be achieved by various types such as- Simple Distillation, Vacuum Distillation, Fractional Distillation, Steam Distillation, Dry distillation (destructive distillation).

Standardization aspects according to today's point of view can again be divided in 3 categories as-

1. Apparatus used in Arka preparation
2. Process of Arka preparation(Methodology)
3. Role of Heat in Arka preparation.

• **Apparatus required for Distillation process –**

1. Boiler(Heating mantle)-To provide and maintain heat.
2. Vessel- In which vapours are produced by heating the liquid to its boiling point
3. Condensor-Cooling device of vapour by circulation of water or

air at atmospheric pressure.

e.g Leibig Condensor, Worm condense, Hallock block, Reflux Condensor, Soxhelt condenser.

4. Receiver-Used for collection of liquid.

• **Method of Arka preparation:**

As per API, process of Arka preparation by simple distillation is given as follows-

1. e drugs taken for Arka preparation are cleaned and coarsely powdered. Some quantity of water is added to it for soaking and kept overnight, this makes the drug soft and when boiled releases all essential principles easily.
2. The following morning, it is poured in Arka yantra(Distillation apparatus) and remaining water is added and boiled. The vapour is condensed and collected in a receiver.
3. In beginning, vapour consists of only steam and may not contain essential principles of drugs. It should be therefore discarded.
4. The last portion also may not contain therapeutically essential substance and hence should be discarded.
5. The aliquots collected in between contains active ingredients and may be mixed together to ensure uniformity of Arka.

• **Role of Heat in Arka preparation:**

1. Heat causes two main processes during distillation, i.e evaporation and another is cooling process or condensation.
2. The distillation apparatus should not be heated directly at high temperature which will cause rapid vaporization and required product will not be at par hence it should be heated gradually and then attend the boiling point of water.
3. Also there are chances of bursting the glassware if high heat is given initially.
4. After reaching the boiling point of water again heat is reduced, and then same temperature is maintained till desired quantity of arka is obtained.
5. This ensures good quality of Arka to be obtained at the end of the process. Distillation process depends on vapour pressure characteristics of liquid mixtures.

### Observations:

After preparation of Arka it will be tested for end/ finished product standardization. Here also we will take into consideration both classical methods of testing end product and the modern ones.

### Classical method-

Author Ravana has explained Arka Prashasti lakshanas (characters of good arka produced )as below,

1. **Dravyadhik saugandhyam:** Arka should have more fragrance than its constituent dravya taken alone
2. **Shankhkundendudhavallo :** On keeping in jeerasthi mruttika patra, the colour of the drug must appear same. The arka must resemble the colour of Shankha (conch shell), kunda, indu (moon) on keeping in other vessels.

3. **Jivhoparigataha swadam dravyabhavam:** Taste of Arka while keeping on tongue should be that of the constituent drug itself. All other arka opposite to above features should be discarded. These are the beautiful standardization parameters for testing Arka in our rich old classics.

#### • Modern methods-

According to API and CCRAS, following Standardization parameters are elaborated.

1. API- Arka is a suspension of the distillate in water with slight turbidity and colour according to nature of drugs used and smell of the predominant drug.
2. As per Pharmaceutical guidelines for analysis of Ayurved and Siddha Formulations (CCRAS)- following analytical parameters must be tested for an Arka formulation.
  - Organoleptic parameters- color, odour, consistency, taste.
  - Physical parameters-
    - Ph

- Specific gravity
- Determination of boiling point
- Refractive index
- Optical rotation
- Viscosity

➤ Chemical parameters-

- Assay for essential oils
- Total acidity
- TLC/HPLC/HPTLC/GC/GC-MS
- Test for heavy metals- Lead, cadmium, mercury, arsenic
- Test for pesticidal residue- OCP, OPP, pyrethroids
- Microbial contamination- Total viable aerobic count, enterobacteriaceae, total fungal count.
- Test for specific pathogens- E-coli, Salmonella, staphylococcus aureus, pseudomonas aeruginosa
- Aflatoxins- B1,B2,G1,G2
- Shelf life

**Discussion:**

References of arka kalpana is not found in Samhita and sangraha kala, but we may find pharmaceutical aspects of Arka kalpana in different literatures like Gadanighraha, Ayurved Sar sangraha, Rasatantrasar and Siddhaprayog sangraha. But detailed explanation regarding all aspects of manufacturing an arka formulation is found in Arkaprakash. It gives a strong base for Standardization of process according to classical texts.

On close examination we see that Arka

yantra told in the classics and the modern day distillation apparatus are following same principle of science i.e distillation which easily helps us in Standardization of the product produced by any one of the method either classical or modern. Process standardization is equally important as product standardization where we can produce a quality product with consistency in all batches prepared.

**Conclusion**

Arka kalpana from Bahishjyakalpana is unique but little ignored formulation, may be due to lack of literature on it or the pharmaceutical aspects have not been much reviewed in Ayurveda. Arkaprakash main authentic text still elaborates all aspects of its preparation right from collecting good quality raw drug to proper water quantity required for soaking, to right amount of heat which will be required for its preparation. And finally Prashasta Arka lakshana tests the prepared Arka for its quality and purity.

Modern methods of testing analytical parameters include everything from basic physical tests to advanced HPTLC or GLC. GLC is preferably used in analysis of compounds which are volatile in nature. Importance of Arka kalpana (utility) can be explained in terms of better shelf life than swaras, kalka, kwatha etc, easier in administration in patients who don't like to take churna, kwatha, and also for Mridu prakruti people (palatability). Arka is prepared by combination of Jal and Agni hence it is laghupaki, vyavayi and vikasi in its gunas. Hence Arka can be used widely, more explored and more research

is needed which may widens the scope of Bhaishjya kalpana.

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*Conflict of Interest: Non*

*Source of funding: Nil*

*Cite this article:*

*"Standardization of Arka Kalpana- A Review."*

*Swaranjali R. Kaswa, Sharada N. Chikurte*

*Ayurlog: National Journal of Research in Ayurved Science- 2020; (8) (6):01- 09*