

REVIEW OF CLASSICAL AND MODERN PARAMETERS FOR STANDARDIZATION OF ARKA KALPANA

*Dr. Vishal Nimdeo, **Dr. Jyoti Waghmare (Kharat), ***Dr. Rajesh K. Ingole, ****Dr. C.E. Lagad

*PG Scholar, Department of Rasashastra and Bhaishajyakalpana, Government Ayurved College & Hospital, Nanded.

**Associate Professor, Department of Rasashastra and Bhaishajyakalpana SRC Ayurved College, Chikhali, dist. Buldana.

***Professor and HOD, Department of Rasashastra and Bhaishajyakalpana, Government Ayurved College & Hospital, Nanded.

****Associate Professor, Department of Rasashastra and Bhaishajyakalpana, Government Ayurved College & Hospital, Nanded.

*Corresponding Author: Dr. Vishal Nimdeo

PG Scholar, Department of Rasashastra and Bhaishajyakalpana, Government Ayurved College & Hospital, Nanded.

Article Received on 29/01/2023

Article Revised on 18/02/2023

Article Accepted on 11/03/2023

ABSTRACT

Ayurveda uses various forms of medicine both traditional *Ayurvedic* or modern formulations. Some of the *ayurvedic* formulations are not studied properly and used widely hence lagged behind. *Arka kalpana*(distillate) is one such formulation. It is more palatable *Ayurvedic* dosage forms in comparison to decoction etc. Different types of distillation and heating methods are given in *Arka Prakash* by *Ravana* for preparing *Arka*. *Arka Kalpana* can be correlated with Distillation in modern pharmaceutical practices. Here, it is explored in details and its standardization techniques are elaborated. The classical *siddhi lakshanas* and modern Standardization aspects regarding this formulation such as Organoleptic parameters, Physical parameters (pH, Specific gravity, refractive index, viscosity etc.) Chemical parameters and analytical parameters (TLC) have been explained in brief.

KEYWORD: *Arka kalpana, Standardization, Distillation, Analytical methods.*

INTRODUCTION

Ayurveda is a science of life and serve to mankind since a long period. The objective of *Ayurveda* is preventing as well as curing the disease. Therefore present formulations or dosage forms are changing time to time according to need. The idea behind preparation of different dosage form is to make it more suitable to the body for better absorption and assimilation. Every step of *Ayurveda* drug manufacturing needs standardization right from raw material to finished product standardization. This ensures the quality, purity and safety of manufactured drug.

'*Arka kalpana*' from *Bahishjyakalpana* is explained in details by author *Ravana* in the text '*Arkaprakash*'. According to *Arka prakash*, *panchavidha kalpanas* include *Kalka, choorna, Rasa, Taila and Arka*. *Arka kalpana* has given specific importance and it opines that it has more potency in comparison to the other.^[1] Due to Potency, reduced dose, better shelf life, easy absorption, fast action and patient compliance *Arka kalpana* is in growing demand among current population.

Arka kalpana was lagged behind either due to lack of appropriate study or this formulation was not being used widely. So, there arises a need to know the importance and methodologies involved in the Standardization of this formulation. The method by which the volatile oil and active principles of the drug are collected is called as *Arka kalpana* and the compound prepared through this procedure is called *Arka*. *Arka* contain the volatile constituents of the drugs used in its preparation. *Arka* is equivalent to 'Aque' or 'waters' of the western pharmacopoea.

The significance of *Arka* are as follows:

1. It can be preserved for longer time than other *Kalpanas* like *Swarasa, Kwath* etc. This *Kalpana* is easy to administer in the patients of *Mridu Prakriti* and one who hesitate to take medicines like *Churna, Kwath* etc.
2. *Arka kalpana* can be easily administered in childrens.
3. *Arka* is prepared by the combination of water and with the help of fire; hence *Arkas* are *Laghupaki*(easily assimilated), *Vyavayi*(spreads breaking all barriers) and *Vikasi*(fast in action) & thus assimilates quickly in the body.
4. *Arkas* have good palatability.

5. *Arka Kalpana* acquires highest position in obtaining the potentially active volatile oils as the condensation takes place during the process of distillation.^[2]

“Standardization of Ayurvedic drug” expression is used to describe all measures from raw material standardization, In process standardization, Quality control, finished drug product standardization. Under the Drug and cosmetic act 1940. The Ayurvedic Pharmacopoeia of India is the book of standard for single and compound drug included therein. In API, Analytical techniques are mentioned for finished product standardization and quality control measures are also described in the form of methods and instruments. But the significance of each Analytical techniques are not mentioned briefly. This review highlights the role of various analytical techniques and importance of classical and Modern parameters of *Arka kalpana*.^[3]

AIM

To review classical and modern Analytical parameters for standardization of *Arka kalpana*.

OBJECTIVE

To understand *Arka kalpana* and importance of its standardization parameters in detail.

MATERIALS AND METHODS

In the present study material related to Analytical standardization according to classical was collected from ancient ayurvedic classics books such as *Arka prakash*, *Ayurved sar samgraha*, and modern parameters from Ayurvedic pharmacopoeia of India and Ayurvedic

Formulary of India. The research article related to study was collected from authentic sources like Pubmed, google scholar articles.

According to Ayurvedic formulary of India (AFI) *Arka* is a liquid preparation obtained by distillation of certain liquids or drugs soaked in water (Drug: WATER Ratio 1:18) using the *Arkayantra* or any convenient modern distillation apparatus.^[4]

Drug standardization means to confirm its identity, quality and purity throughout all phases like drug collection, processing, storage, distribution etc.^[5]

● Method of *Arka* preparation

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

1. 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*.^[6]

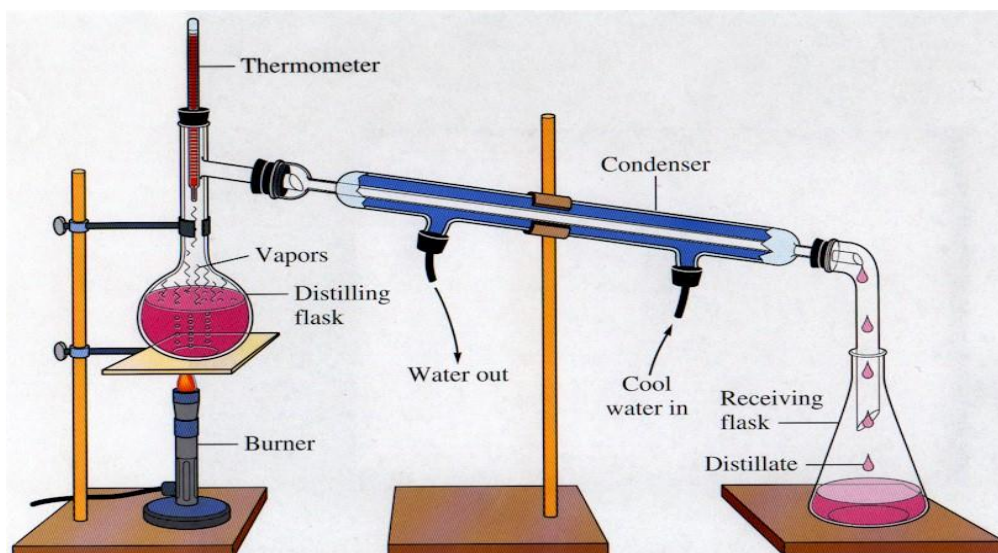


Figure no. 01. *Arka yantra* setup (distillation apparatus).

● *Prashastha Arka lakshanas* (analytical parameters) according to Classics

Author *Ravana* has explained *Arka Prashasti lakshanas* (characters of good *Arka*)

1. *Dravyadhik saugandhyam*.
2. *Shankhkundendudhaval*.

3. *Jivhparigataha swadam dravyabhavam*.^[7]

● Analytical Parameters according to Modern

As per Pharmaceutical guidelines for analysis of *Ayurved and Siddha* Formulations (CCRAS)- following analytical parameters must be tested for an *Arka* formulation.^[8]

Table No.1 category wise distribution of Modern Analytical parameters.

Organoleptic Parameters	Physico-chemical	Toxic Parameters	Biological Parameters
Description	pH	Test for heavy metals	Microbial contamination
Colour	Specific gravity at 25°C	Pesticide residue	Total viable aerobic count
Odour	Boiling point		Total fungal count
Taste	Assay for essential oil		Test for specific pathogen
Clarity Test	Refractive index		Aflatoxins
	Optical rotation		Shelf Life
	Viscosity		
	TLC/HPTLC/GLC/GC-MS		
	Total acidity		

OBSERVATIONS

Table No. 2 . Classical parameters and their significance.

Sr no.	Name of Parameter	Inference
1	<i>Dravyadhik saugandhyam</i> (Odour)	it should have more fragrance than Constituent drug
2	<i>Shankhakundendudhavallo</i> (Colour)	Arka must resemble the color of <i>shankha kunda indu</i>
3	<i>Jivhoparigataha swadam dravyabhavam</i> (Taste)	It should have taste of the drug itself only.

Table no. 3. Modern Parameters and their significance.

Sr No.	Name of Parameter	Inference	Significance ^[9]
1.	PH (pH meter)	the pH value indicates whether the product is acidic or basic.	-To analyse the quality of drug sample
2.	Specific gravity (pycnometer)	it gives the idea about the density. it indicative of concentration of solutes in a solvent. the molecular information can be assessed in a non invasive way by determining specific gravity	-Gives idea about Pharmacokinetics of drug i.e.- absorption and sample retention - Packaging of products. -For arka it is probably less than that of water.
3.	Boiling range (distillation apparatus)	it is the range of temperature within which the whole or a specified portion of drug distills.	-It is a criteria to analyse identity, quality and purity of drug sample and vehicle
4.	Viscosity (U Tube viscometer)	It is a property of liquid that measures its frictional resistance to flow.	-Estimation of flow property, consistency and stability of liquids , semi liquids and semi solids.
5.	Optical rotation (polarimeter)	certain substances in a pure state, in solution and in tincture posses the property of rotating the plane polarized light is known as optical rotation.	-Estimate the concentration of substance in a solution for purity checks.
6.	Refractive Index (Abbe's refractometer)	it is the ratio of the sine of the angle of incidence to the sine of angle of refraction of a beam of light passing from air into the substance.	-Batch to batch consistency of product. -Indicative tool for purity determination.
7.	Volatile oils (Clevenger's Apparatus)	These are odorous liquid principles that evaporates when exposed to air at ordinary temperature.	Estimation of drug content that is volatile. Indicates potency of sample. Evaluating flavouring and aromatic property of sample
8.	Thin layer chromatography	TLC is a technique in which a solute undergoes distribution between two phases stationary phase and mobile phase. TLC is and analytical technique that	- Batch to batch variation. Determination of chemicals as adulterants in ayurvedic herbal formulations. - Acts as precursor for method

		identifies and separates compounds from the mixture in different colors spots or bands.	development to quantify the phytochemicals by HPTLC. -Determination of completion of reaction.
9.	Test for heavy metals	Heavy metals are toxic elements and harmful for health in herbal medicine. (and changed in form in rasa and bhasma medicines beneficial for health.)	Measuring the amount of heavy metals as toxicity.
10.	Biological Test	Quantitative determination microbes as total bacteria at aerobic condition and number of bacterial colony forming units per g of the sample.	To evaluate bacterial and fungal contamination and hygienic conditions for handling and storage conditions.
11.	Aflatoxins	Aflatoxins are very dangerous to the human body. Accurate analysis is required to determine residual or lower level deflection of aflatoxins. 4 types- B1 >G1>B2>G2 (decreasing toxicity sequence)	Evaluation of toxic substances that can cause several complications to human in the sample.



1. pH meter



2. Abbe's refractometer



2. Pycnometer

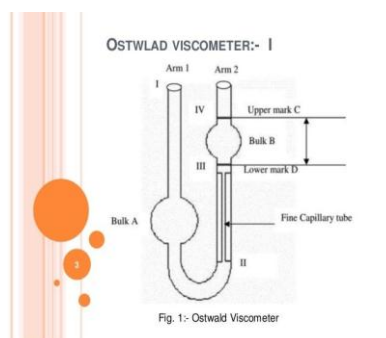


Fig. 1:- Ostwald Viscometer

4. Viscometer.

Figure no. 02. Instruments used for testing different Analytical parameters.

Table no. 4. Some Examples of Modern Parameters values.

Sr No.	Ela Arka ^[10]	Mukhpakharo arka ^[11]	Amrutottar arka ^[12]	Pudina arka ^[13]
1.pH	2.75	4.20	6.0	7.21
2.Specific Gravity	0.9787	1.0	0.9922	1.002
3.Refractive Index	1.34		1.3318	1.3306
6. Viscosity	0.0053			

DISCUSSION AND CONCLUSION

Arka kalpana is not found in *Samhita kala*. The pharmaceutical aspects of *Arka kalpana* are found in

different literatures like *Gadanighraha*, *Ayurved Sar samgraha*, *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. *Arka yantra* explained 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.

- pH of *Arka* is different according to constituent drug.
- Specific gravity of any *Arka* is nearly equal to water (0.997656)
- Refractive index is nearly same as water (1.33158)

Arka kalpana is a unique but little ignored formulation, may be due to lack of literature study on it or the pharmaceutical aspects have not been much reviewed in *Ayurveda*. *Arkaprakash* is 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 *Mriduprakruti* people (palatability).

REFERENCES

1. Tripathi I. *Arka Prakasha* by Ravana:Hindi commentry 2nd edition. Chaukhamba Krishanadas Academy, Varanasi. 2011; 20-21,42.
2. Ayurved Saar Sangraha. Reprint.Nagpur: Baidyanath Ayurved Bhavan Pvt Ltd; 2004; 557-65.
3. Department Of AYUSH. The Ayurvedic Pharmacopeia Of IIndia. Delhi: 2010; Part 2, volume 3 (1stEdition) p. 1-24.
4. The Ayurvedic Formulary of India Part II, 1st English Ed. New Delhi: Govt. Of India, Ministry of Health and Family Welfare 2000; 41-42.
5. Swaranjali R. Kaswa, Sharada N. Chikurte. Standardization of *Arka Kalpana*- A Review." *Ayurlog*: NJRAS -2020; 8(6): 01-09.
6. Department Of AYUSH. The Ayurvedic Pharmacopeia Of IIndia.Delhi:2010;Part 2, volume 3 (1stEdition) p. 1-24.
7. Tripathi I. *Arka Prakasha* by Ravana:Hindi commentry 2nd edition. Chaukhamba Krishanadas Academy, Varanasi. 2011; 20-21,42.
8. CCRAS general guidelines for drug development of ayurvedic formulations, 1 29.
9. N. K. Garg. *Ayurveda and herbal formulations- A testing protocol for quality control*. 1st Edition. Volume 1.
10. Rakshitha D Pharmaceutical Standardization of *Ela Arka*, int j ayu pharm chem, Department of Rasashastra and Bhaishajya Kalpana, Sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital, Hassan, Karnataka, India.
11. Saranyamol K, Noble T M. Pharmaceutico Analytical Study of *Mukhapakahara Arka*. *International Journal of Ayurveda and Pharma Research*. 2022; 10(10): 16-22.
12. Deepthi CP, Basavaraj Y Ganti, Vinay R Kadibagil, Sunil Kumar KN. Pharmaceutico-analytical Study of *Amrutottara arka*. *J Ayu Med Sci.*, 2016; 1(1): 73-9. DOI: 10.5530/jams.2016.1.15
13. Yogita J. Jethava - Quantitative estimation of menthol (*mentha arvensis* linn.) in the preparation of *pudina churna* and *pudina arka*. *WJPR* 10(12): 1061-1070.