

Quality assessment of *Nimbadi Arka* prepared by different methods

Research Article

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Abstract

Arka kalpana is the unique formulation mentioned in *Arka Prakasha*. *Nimbadi Arka* is mentioned in *Talurogaadhikara* as *Taluroganashaka Arka*. Its ingredients are *Nimba* (*Azadirachta indica* A.Juss), *Vacha* (*Acorus calamus* L), *Rasna* (*Pluchea lanceolata* L), *Paatha* (*Cissampelos pareira* Linn), *Ativisha* (*Aconitum heterophyllum* Wall.ex.Royle) and *Katurohini* (*Picrorhiza kurroa* Royle ex Benth). Aims and objectives: To assess the quality and fix the standard method of preparation of *Nimbadi Arka*. Materials and Methods: In this study, the *Arka* is prepared according to the method described in the Ayurveda Formulary of India, *Sharangadhara Samhita*, *Arka Prakasha*, Text Books of *Bhaishajya kalpana*, *Ayurveda sara samgraha* and Ayurveda Pharmacopoeia of India. The *Nimbadi Arka* is prepared by 4 different methods. To assess the quality of the *Arka*, a physiochemical analysis is done. Result: From the *Arka* prepared by four different methods, the high-quality *Arka* obtained is the one manufactured according to the method described in the Ayurvedic Formulary of India (AFI).

Key Words: *Nimbadi Arka*, *Taluroganashaka Arka*, *Arka Yantra*, Distillation method, *Panchavidha Kashaya Kalpana*, *Upakalpana*.

Introduction

Arka kalpana is one among the *Panchavidha Kashaya Kalpanas* mentioned in *Arka Prakasha*, written by the king Ravana (1). In *Arka Prakasha* different types of *Arka yogas* are mentioned for different diseases. *Prashastha Arka lakshana* is mentioned as

- *Tikshna gandha* (strong fragrance)
- When kept in *Mruttika paatra* (mud vessel) colour of *Arka* is the same as that of the drug.
- When kept in any transparent vessel the colour of *Arka* should be like *Shankha* (conch) and *Chandrama* (moon-milky white)
- When kept on the tongue, the taste should be that of the drug (2)

In *Arka Prakasha*, different types of *Arka* are described for *different Roga Adhikaras* depending upon the site of disease manifestations. *Nimbadi Arka* is one among them which is mentioned as *Taluroganashaka Arka* (3). The formulation includes the ingredients like *Nimba* (*Azadirachta indica* L.)(4,5), *Vacha* (*Acorus calamus* L)(6,7), *Paatha* (*Cissampelos pareira* Linn) (8,9), *Rasna* (*Pluchea lanceolata* L)(10,11), *Katurohini*

(*Picrorhiza kurroa* Royle ex Benth.)(12,13) and *Ativisha* (*Aconitum heterophyllum* Wall.ex.Royle) (14,15). In *Arka Prakasha* no detailed explanation is mentioned for the preparation of *Nimbadi Arka*. This is an attempt to develop a standard operative procedure for the preparation of *Taluroganashaka Arka* (*Nimbadi Arka*) and to analyse the parameters related to its quality control.

Materials and Methods

The raw drugs are collected from KLEU'S GMP certified Ayurvedapharmacy, Khasbag, Belgavi, Karnataka. Authentication of the drug and quality assessment of the drugs is done at KLE Ayurveda Pharmacy and the same drugs were used for the preparation. The fresh leaves of *Nimba* are collected from the *Vrukshayurveda* department of KLE Shri B M Kankanawadi Ayurveda Mahavidyalaya, Shahpur, Belgavi, Karnataka. Authentication of the drug and quality assessment of the drugs is done at KLE Ayurveda Pharmacy and DTL and the same drugs were used for the preparation. (Fig.1-6)

Figure 1: *Vacha*



Figure 2: *Paatha*



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Deepa AC et.al., Quality assessment of Nimbadi Arka prepared by different methods



In this study the method of preparation of *Nimbadi Arka* is followed as per the methods mentioned in *Arka Prakasha*, *Sharangadhara Samhitha*, Ayurveda Formulary of India, Text Books of *Bhaishajya Kalpana*, *Ayurveda sara samgraha* and Ayurveda Pharmacopoeia of India. As each of the ingredients has different types of volatile contents, we have tried the combination of drug and water in a 1:10 ratio. (16)

This study is done in two phases-

- Phase 1 – Preparation of *Nimbadi Arka* in 4 different methods
- Phase 2 – Assessment of quality of all the products

Phase 1: Preparation of Arka in 4 different methods: (Fig:7,8,9)

Method I: Arka of all the drugs prepared separately without soaking:(17)

- **Arka of Nimba:** 25g of fresh *Nimba* leaves are made into pieces and mixed with 250ml water. Then it is transferred into *Arka Yantra*. When vapours start coming, it is condensed and collected in a conical flask. Initial 50 ml (20%), middle 130ml(60%) and last 50 ml (20%) is collected. The first 20% and the last 20% will not have any smell or taste of volatile content and may not contain therapeutically essential substances. Both are discarded. It takes around 5 hours to collect 60% of the total water contents. The liquid obtained is clear, transparent and possesses the smell of *Nimba* and has a bitter taste. (18)
- **Arka of Vacha:** 25g of crushed powder of *Vacha* is mixed with 250ml of water. Then it is transferred into *Arka Yantra*. The temperature is maintained at around 100°C till the boiling starts. Then it is decreased up to 90°C. Initial 130ml(20%) have a slight smell of volatile oil of *Vacha*. The fragrance is more in the next 150ml (middle 60%) and it is good milky white coloured and transparent. It takes around 4 hours to collect 60% of the total water contents.(19)
- **Arka of Rasna:** 25g of crushed powder of *Rasna* is mixed with 250ml of water. Then it was transferred

into *Arka Yantra*. Temperature is maintained at around 100°C till the boiling starts. Initial 50ml, middle 25ml and last 75ml were collected. The middle 25 ml is having the slight fragrance of volatile content of *Rasna*. It takes around 5 hours to collect 60% of the total water contents. The liquid collected is clear and transparent. (20)

- **Arka of Paatha:** 25g of crushed powder of *Paatha* is added with 250ml of water. Then it is transferred into *Arka Yantra*. Temperature is maintained at around 100°C till the boiling starts. The initial 50 ml and middle 60 ml *Arka* is collected. The beginning part is light orange in colour. The remaining is normal like water. It takes around 6 hours to collect 40% of the total water contents. (21)
- **Arka of Katurohini:** 25 gm of crushed powder of *Katuki* is added with 250ml of water. Then it is transferred into *Arka Yantra*. Temperature is maintained at around 100° C. When vapours started coming, they are condensed and collected in a beaker. The beginning 50 ml and middle 130 ml are collected. It takes around 6 hours to collect 60% of the total water contents. The collected liquid is greenish-yellow in colour, clear and transparent. (22)
- **Arka of Ativisha:** 25 gm of crushed powder of *Ativisha* is added with 250ml of water. Then it is transferred into *Arka Yantra*. Temperature is maintained at around 100°C. When vapours started coming, they are condensed and collected in a receiver. A total of 100ml of the *Arka* is collected. It takes around 2 hours to collect 40% of the total water contents. The liquid obtained is clear and transparent. (23)

Method II: Arka is prepared with all the dried drugs combined and soaked over one night:

25g of the whole drug (all the ingredients are dry) is added with 200ml water and kept overnight. On the next day morning, 50 ml of water is added and then it is transferred into *Arka Yantra*. Temperature is maintained at around 100°C throughout the preparation. When vapours started coming, they are condensed and collected in a receiver. Initial 50 ml, middle 130 ml and last 50 ml are collected. It takes around 1 hour to collect 60% of the total water contents. A clear, transparent, colourless *Arka* is obtained. (24,25)(Fig.13)

Method III: Arka prepared with all the dried drugs combined without soaking:

25g of fresh *Nimba pathra* is added with 250ml water. Then it is transferred into *Arka Yantra*. Temperature is maintained at around 100°C throughout the preparation. When vapours started coming, they are condensed and collected in a beaker. The beginning 50 ml, middle 130 ml and last 50 ml are collected. It takes around 2 hours to collect 60% of the total water contents. A clear, transparent, colourless liquid is obtained. (26)

Method IV: Arka prepared with fresh *Nimba pathra* and other 5 drugs were in dry form with soaking:

25g of each drug are added with 200ml water and kept overnight. On the next day, 50 ml of water is added and then it is transferred into *Arka Yantra*. Temperature is maintained at around 100°C throughout the

preparation. When vapours started coming they are condensed and collected in a receiver. The initial 69 ml that has a slightly yellow colour, the middle 130 ml, and last 50 ml of *Arka* are collected. It takes around 1 hour to collect the total water contents. (27)



Phase 2: Analytical study of all the final products

Observation and Results:

1. Table:1-Mode of Preparation

Preparation method	Quantity of the ingredients	Amount of water added
Method I (single drugs without soaking) <i>Arka of Nimba</i> <i>Arka of Vacha</i> <i>Arka of Rasna</i> <i>Arka of Paatha</i> <i>Arka of Katurohini</i> <i>Arka of Ativisha</i>	Fresh Leaves of <i>Nimba</i> -25gm Crushed Tubers of <i>Vacha</i> -25gm Crushed Rhizome of <i>Rasna</i> -25gm Crushed Stem of <i>Paatha</i> -25gm Crushed Roots of <i>Katurohini</i> -25gm Crushed Roots of <i>Ativisha</i> -25gm	250ml 250ml 250ml 250ml 250ml 250ml
Method II (all drugs dried and combined with soaking)	Dried leaves of <i>Nimba</i> -4.16gm Crushed Rhizome of <i>Vacha</i> -4.16gm Crushed Rhizome of <i>Rasna</i> -4.16gm Crushed Roots of <i>Paatha</i> -4.16gm Crushed Rhizome of <i>Katurohini</i> -4.16gm Crushed Roots of <i>Ativisha</i> -4.16gm	200ml added on previous day for soaking(24 hours) 50 ml added on the day of preparation
Method III (All drugs dried and combined without soaking)	Dried Leaves of <i>Nimba</i> -4.16gm Crushed Rhizome of <i>Vacha</i> -4.16gm Crushed Rhizome of <i>Rasna</i> -4.16gm Crushed Roots of <i>Paatha</i> -4.16gm Crushed Rhizome of <i>Katurohini</i> -4.16gm Crushed Roots of <i>Ativisha</i> -4.16gm	250ml
Method IV (Fresh <i>Nimba pathra</i> and all other drugs dried and combined with soaking)	Fresh Leaves of <i>Nimba</i> -4.16gm Crushed Rhizome of <i>Vacha</i> -4.16gm Crushed Rhizome of <i>Rasna</i> -4.16gm Crushed Roots of <i>Paatha</i> -4.16gm Crushed Rhizome of <i>Katurohini</i> -4.16gm Crushed Roots of <i>Ativisha</i> -4.16gm	200ml added on previous day for soaking(24hours) 50 ml added on the day of preparation

2. Temperature

Temperature was maintained at 100°C throughout the preparation in all the methods.

3. Table:2-Quantity of Arka obtained

Methods	Quantity collected beginning,middle and end		
Method I			
Arka of Nimba	50 ml	130ml	50ml
Arka of Vacha	50 ml	130ml	50ml
Arka of Rasna	50ml	25ml	75ml
Arka of Paatha	50 ml	25ml	60ml
Arka of Katurohini	50ml	130ml	50ml
Arka of Ativisha	50ml	100ml	50ml
Method II	50ml	130ml	50ml
Method III	50ml	130ml	50ml
Method IV	69ml	130ml	50ml

4. Table:3-Organoleptic properties: (Fig.10-19)

Methods	Form	Colour	Odour	Taste
Arka of Nimba	Liquid	Colourless	Good fragrance of volatile content of Neem	Tiktha Rasa(Bitter)
Arka of Vacha	Liquid	Milky white	Good fragrance of volatile oil	Tiktha Kashaya Rasa(Bitter and Astringent)
Arka of Rasna	Liquid	Colourless	Slight smell of volatile oil Odourless	Tingling,Tasteless
Arka of Paatha	Liquid	Light orange colour for first 75ml,then colorless clear liquid	Odourless	Tingling,Tasteless
Arka of Katurohini	Liquid	Greenish yellow	Odourless	Tingling,Tasteless
Arka of Ativisha	Liquid	colourless	Odourless	Tingling,Tasteless
Method II	Liquid	Milky white colour,clear	Characteristic	Tiktha rasa(Bitter taste) with slight tingling
Method III	Liquid	Milky white colour,clear	Characteristic	Tiktha rasa(Bitter taste) with slight tingling
Method IV	Liquid	Slight yellow colour in first 69 ml,then remaining part was milky white colour, clear	Slight neem odour	Tiktha rasa(Bitter taste) with slight tingling

Figure 10 Arka of Nimba



Figure 11 Arka of Vacha



Figure 12 Arka of Rasna



Figure 13 Arka of Paatha



Figure 14 Arka of Katurohini

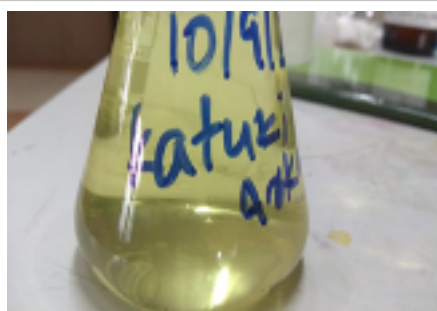
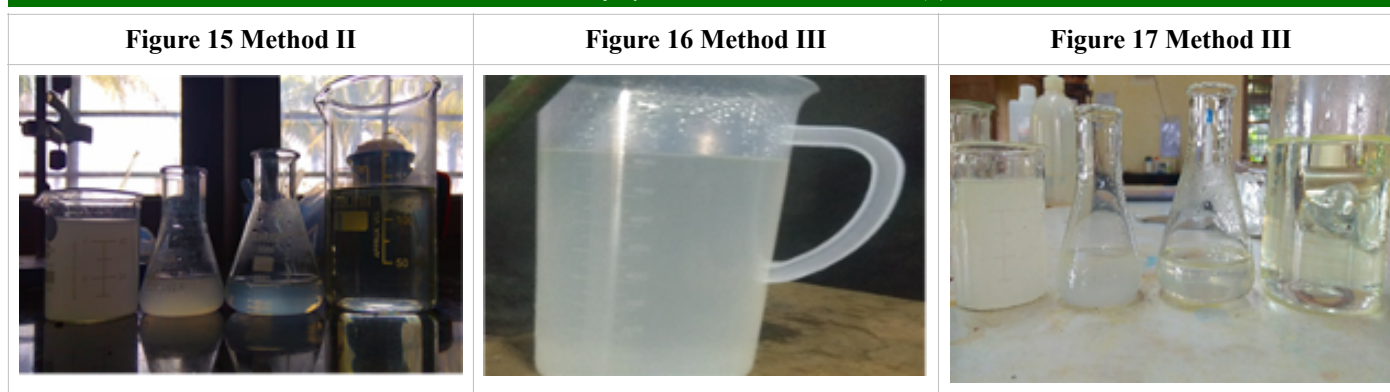


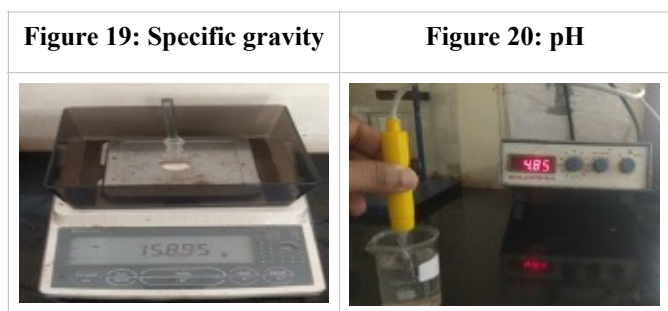
Figure 15 Arka of Ativisha





**5. Table:4-Physiochemical analysis:(28,29)
(Fig:20,21)**

Methods	Sp.gravity	pH
Method I		
<i>Arka of Nimba</i>	1.002	7.04
<i>Arka of Vacha</i>	1.003	4.08
<i>Arka of Rasna</i>	0.987	4.55
<i>Arka of Paatha</i>	1.002	6.59
<i>Arka of Katurohini</i>	1.008	6.12
<i>Arka of Ativisha</i>	0.997	7.56
Method II	1.00	4.86
Method III	1.00	4.86
Method IV	1.00	4.86



Discussion

Nimbadi Arka is prepared by 4 different methods as there are no specific methods of preparation explained in classical texts except for its ingredients and indications. This study is aimed at the fixation of a standard method of preparation of *Nimbadi Arka*.

In *Arka Prakasha* the amount of water for soaking is explained separately for *Athi Katina Dravya* (Hard drugs), *Katina Dravya* (semi-hard drugs), *Ardra Dravya* (soft drugs), Leaves etc. (30). So we have prepared by soaking the drugs.

In the Ayurveda Formulary of India, the amount of water to be added is not exactly mentioned. It simply mentions that drugs should be soaked in some quantity of water and on the next day morning, one has to add the required quantity of water and prepare *Arka* (31)

In the Textbook of Bhaishajya kalpana, it is mentioned that the drugs should be soaked in some amount of water for 2-4 hrs and 10 times water should be added to the drug for preparing *Arka* (32,33). So we tried with 25g of drugs and added 250ml of water in all the methods.

In *Ayurveda Sara Samgraha* it is written that the drugs should be soaked overnight to get maximum absorption. So in this study, drugs are soaked in three-quarters of the total quantity of water required and then prepared. (34)

In method II we prepared *Arka* using all dry drugs soaking overnight. By soaking, the drugs will get softened and will absorb all the water content so that when *Arka* is prepared maximum essential contents can be obtained. (35)

In method IV we prepared *Arka* using fresh *Nimba pathra* and all the other drugs in dry form and soaked overnight. *Nimba pathra* is considered supreme among 6 drugs of *Nimbadi Arka* which contains volatile contents such as Nimbin, Nimbanene, and has antibacterial and antifungal properties (36). Considering this, we tried with fresh *Nimba* leaves.

In method III the *Arka* is prepared without soaking the drugs and all the drugs used are in dry form. This is tried on the basis of the *Kashaya* preparation. While boiling continuously for 5-6 hours, the dry drugs will absorb the water and it expels maximum essential contents as that of *Kashaya*. (37)

In methods II, III and IV *Arka* obtained is having all the characteristics of the drugs in it. Organoleptic properties are also the same in all the preparations. Considering the higher efficacy of fresh *Nimba pathra*, we fixed the SOP in which fresh leaves of *Nimba* are added and other drugs in dry form are used for the preparation of *Nimbadi Arka*.

In the Ayurvedic Formulary of India, it is mentioned that the first 20% and last 20% of the preparation should be discarded and the middle 60% is to be collected (38). In this study, this general rule is applicable in the case of *Arka of Nimba*, *Ativisha*, and *Vacha* and in combined methods. In this case, *Arka of Rasna's* first 20% is not having any characteristic features of the drug. The middle 25ml (10%) is possessing only a slight fragrance of volatile content. The rest of the quantity is devoid of the characteristics of the drug. *Arka of Paatha* appeared as light orange colour for the first 75 ml of the total quantity. *Arka of Vacha* had a strong fragrance of its volatile content Asarone, due to which the liquid was possessing milky white colour. This can be correlated with that mentioned in *Prashastha Arka Lakshana*.

The temperature is maintained at 100°C throughout the preparations in all the methods so that the maximum amount of content is obtained.

Though *Arka*, when prepared individually, was possessing different organoleptic and phytochemical properties, when mixed together, the characteristics were the same as that of *Arka* prepared with combined drugs.

Conclusion

Arka is a unique formulation that is included in *Panchavidha Kashaya Kalpanas* mentioned by the king Ravana in *Arka Prakasha*. On the basis of its method of preparation, it can be considered as *Upakalpana* of *Phanta Kalpana*. It is an extract of the drugs which is added with water and prepared by the distillation method. The final product obtained by the distillation method will have all the characteristic features of the ingredients. After trying different methods of preparation and quality analysis of the products, we have decided to prepare *Nimbadi Arka* with fresh *Nimba* leaves and other 5 drugs like *Vacha*, *Rasna*, *Paatha*, *Ativisha* and *Katukurohini* in dry form added with 10 times of water in the ratio 1:10. Considering the practical approach to manufacturing and the same quality of the final product collected in the pilot study, we have prepared *Nimbadi Arka* without soaking the drugs. The final product was a clear, transparent liquid possessing characteristic features of all the 6 drugs.

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