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Pharmaceutical Analysis on Thriphala, Lodra and Shigrupallava Arka

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Abstract: *Arka Kalpana, a distinctive Ayurvedic formulation, emerged during the latter Samhita period, characterized by precise preparation methods and therapeutic efficacy. Its palatability surpasses traditional dosage forms like Swarasa, Kalka, and Kwatha. As outlined in Arka Prakasha, the pioneering text on distillation procedures, Arka Kalpana boasts enhanced potency compared to other Kalpanas It is more palatable Ayurvedic dosage forms in comparison to decoction etc. Some of the ayurvedic formulations which are in the form of Arka Kalpana and widely used were not studied properly Different types of distillation and heating methods are given in Arka Prakasha by Ravana for preparing Arka. Arka Kalpana can be correlated with Distillation in modern pharmaceutical practices. Many local curative and preventive application has been mentioned in ayurvedic classics for the treatment of netraroga like seka aschoytana, pindi, vidalaka, anjana etc. According to acharya Vagbhata aschyotana is the first line of treatment in netra rogas. In netraroga chikitsa Thriphala ,lodra and Shigru pallava were widely used for various kriyakalpas due to its chakshushya property.. In this project, these 3 drugs (Thriphala, Lodra & Shigru pallava) was prepared in to arka formulation and was subjected to organoleptic evaluation and physicochemical tests.*

Keywords: Thriphala arka,Lodra arka,Shigru pallava arka

I. INTRODUCTION

Ayurvedic pharmacology emphasizes the significance of Panchavidha Kashaya Kalpanas, primary dosage forms that serve as the foundation for secondary preparations. Among these, Arka Kalpana stands out due to its distinct preparation method and efficacy. As outlined in Ravana's Arka Prakasha, the five kalpanas comprise Kalka, Choorna, Rasa, Taila and Arka 1. Arka Kalpana is particularly valued for its enhanced potency, attributed to its dosharahithatva and unique properties. Its advantages include higher efficacy, lower dosage requirements, extended shelf life, rapid absorption, swift action and improved patient compliance. Bhaishajya kalpana deals with various formulations, pharmaceutical and therapeutic uses of the drug. According to Panchavidha Kashaya Kalpana the dosages varies. They are Swarasa, Kalka, Kwatha, Hima and Phanta. According to Arka Prakasha 2 written by king RAVANA - Kalka, Churna, Rasa, Taila and Arka are Panchavidha Kashaya Kalpanas. Because of its potency, Arka Kalpana has got more importance than other Kalpana's. This ancient manuscript outlines various Arka yoga formulations for treating diverse ailments. References of Arka Kalpana were not found in either Vedic period or in Samhita period. Arka Kalpana was foremostly mentioned by 'Acharya Shodhala' during the 12th century. Beyond this in 'Gadanigraha', on the chapter 'Asavadhikara' in the context of 'Kharjurasava' and Sahasrayoga also described about Arka yantra and Arka preparation. Even though different books were written on Arka Kalpana during the Modern era, but Arka Prakasha written by Ravana is considered as a comprehensive referral book as far as Arka Kalpana is concerned. Ayurvedic ophthalmology is mainly found in Susrutha samhitha Uttara tantra. Broadly netra roga chikitsa is classified into samanya chikitsa and vishesha chikitsa. Sarvdehika chikitsa includes panchakarma, and vishesha chikits includes netra

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kriya kalpas which are the local external, medicinal therapies of eye such as tarpana, putapaka, seka aschyotana, anjana, vidalaka and pindi. Kriya kalpa means the procedures in which various drugs are applied in and around the eyeball as a treatment modality. Aschyotana is considered as the first line of treatment in all eye disease where the dosha vitiation is minimal. Oushadha Kalpana increases the quality of medicine and influences the action of drug. For aschyotana different mode of preprations like swarasa, kashaya,, ksheera, ghrta, arka, are commonly used. Aschyotana with arka is considered to be more potent and less irritant as it is a distilled liquid of crude drug compared to swarasa and kashaya. For the present study preparation and pharmaceutical analysis on Triphala, 15 Lodra and Shigrupallava arka by considering suitable phyto- chemical parameters which may add considerable input to the existing knowledge. Thriphala, is an ayurvedic preparation composed of three equal proportions of herbal fruits viz. Terminalia chebula, Phyllanthus emblica, and Terminalia belerica. Triphala has extensive usage in all eye diseases. Lodra (Simplococus racemosa) & Shigru (Moringa oleifera Lam.) is an important drug of Ayurvedic pharmacopeia, commonly used in eye diseases This project endeavours to find out the pharmaceutical analysis of thriphala, lodra and sigru pallava arka alongside analyzing critical parameters for quality assurance and control.

Analytical Parameters:

The three samples (sample 1- Thriphala arka, sample 2- Lodra arka, sample 3 Shigrupallava arka) were analyzed by using the following parameters: I. Organoleptic characters: Colour: Rupa Odour: Gandha Consistency: Sparsha Taste: Rasa The Sparsha (Consistency), Rupa (Colour), Rasa (Taste) and Gandha (Odour) of the samples were noted. These characters correspond to the Panchendriya Pariksha of Ayurveda. These various organoleptic characters provides an idea regarding the genuinely of the sample both to the physician and patient. These give a primary idea about the quality of different formulations without using any chemical tests.

Figure 1 : Thriphala churna

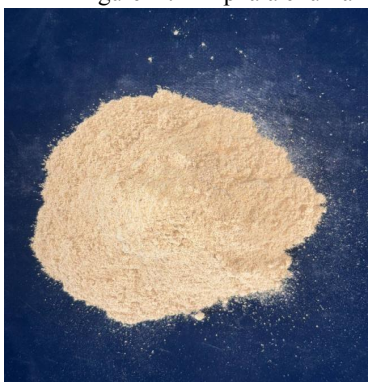

Figure 2 : Lodra churna

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Figure 3 : Shigru pallava churna

Table no : 1 Organoleptic parameters

Organoleptic characters	Sample 1	Sample 2	Sample 3
Form	Liquid	Liquid	Liquid
Colour	Colourless	Colourless	Colourless
Odour	Odourless	Odourless	Odourless
Taste	Tasteless	Tasteless	Tasteless

Above Table no 1 reveals the organoleptic parameters of Sample 1 i.e. *Thriphala arka* was colourless liquid without specific odour and taste .Sample 2 i.e. *Lodra Arka* was transparent and clear liquid without any odour and taste.Sample 3 i.e *Sigru pallava arka* was colourless liquid without any peculiar taste and odour.

Physico-chemical parameters:

Determination of Foreign Matter of raw materials.

It was determined by taking the 100 gm weighed quantity of Sample 1 (*Triphala churnam*),Sample 2(*Lodra churnam*)and was spread in a thin layer. 1 kg of Sample 3 (fresh *Sigru pallava*) were collected and washed under clean water. Foreign matters was separated out and weighed and calculated out.

Table no : 2 Foreign Matter of raw materials

Sample	Determination of Foreign Matter % w/w
Sample 1	5%
Sample 2	5%
Sample 3	0%

Table no. 2 reveals that in Raw *Thriphala churna* and *Lodra churna* have 5% of foreign matter. *Sigrupallava* have no foreign matter. These values reveals the adulteration of sample 1 and 2, and is less and within its normal limit.

B. Loss on drying at 110^0 c

This test was conducted to find out the moisture content in the samples. About 1g, accurately weighed samples of 1 , 2 and 3 were taken in a previously dried and weighed dish and heated in a hot air oven at 110^oC till constant weight. It

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was cooled and the weight was noted. Difference between the weights was calculated and taken as the loss on drying. The loss on drying of the sample was expressed as % w/w.

Figure 4 : Weighed sample 1

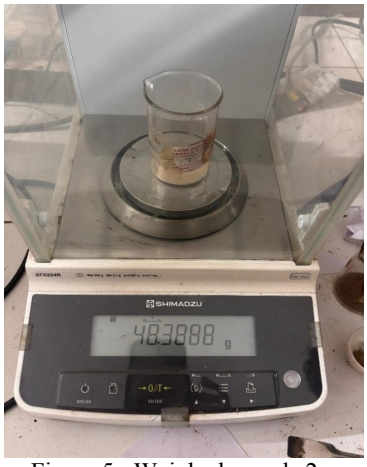

Figure 5: Weighed sample 2

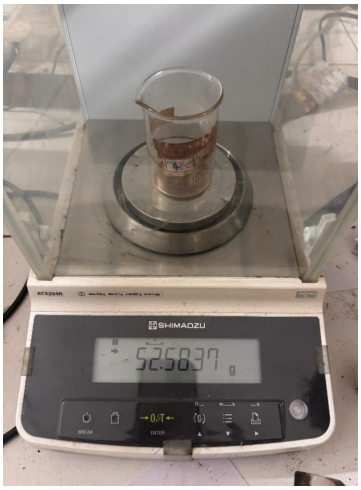

Figure 6: Weighed sample 3

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Table no : 3 Loss on drying

Sample	Loss on drying (% w/w)
Sample 1	2.6981
Sample 2	0.1209
Sample 3	1.2067

Table no .3 reveals that Loss on drying for three samples were within its normal limit.

C. DETERMINATION OF pH

The pH value conventionally represents the acidity or alkalinity of an aqueous solution. In the pharmacopoeia, standards and limits on pH have been provided for these pharmacopoeial substances in which pH as a measure of the hydrogen activity is important from the stand point of stability or physiological suitability. The measurement of pH is generally done with a suitable potentiometric meter known as the pH meter fitted with two electrodes, one constructed of glass and sensitive to hydrogenation activity and the other a calomel reference electrode. The determination i. carried out at temperature of 254° ± 2°, un less otherwise specified in the individual monograph.

Apparatus:

The pH value of a solution is determined potentiometrically by means of a glass electrode, a reference electrode and a pH meter either of the potentiometric or of the deflection type. Operate the pH meter and electrode system according to the manufacturer's instructions.

Method

Prepare the meter: Ensure the meter is in pH measurement mode.
Prepare the electrode: Rinse the electrode with distilled water and blot it with a tissue to remove excess water.
Prepare the sample: Ensure the sample is at the same temperature as the meter. You can use a thermometer to measure the temperature and enter it manually, or use an ATC probe to automatically communicate the temperature.
Submerge the electrode: Dip the electrode into the sample, making sure the tip and junction are completely submerged.
Stir: Stir the sample gently and uniformly for about 30 seconds.
Wait for a stable reading: Wait for a stable reading, which can take at least 1–2 minutes.
Record the reading: Record the pH value and temperature.
Repeat: Repeat steps 3–6 for multiple samples.
Clean and store the electrode: Rinse the electrode thoroughly and store it in a storage solution. The storage solution is usually 3 molar potassium chloride (KCl).
Calibrate the meter: Calibrate the meter before each use, or at least every morning. Use calibration solutions with known pH levels, such as pH 4.0, 7.0, and 10.0.

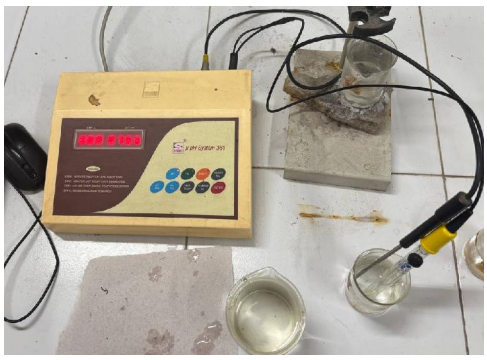

Figure no 7 : pH of Sample 1

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Figure no 8 : pH of Sample 2

Figure no 9 : pH of Sample 3

Table no: 4 pH values of each samples

Sample	pH
Sample 1	7.42
Sample 2	7.37
Sample 3	7.46

Table no .4 reveals that the three samples were slightly alkaline in nature and having values around 7.5.

D. Determination of refractive index

The refractive index of a sample also called the index of refraction, is defined as the quotient of the speed of light in vacuum and the speed of light in the medium. It is a dimensionless number that depends on the temperature of the medium and the wavelength of the light beam. Placed a drop of water on the prism and adjusted the drive knob in such a way that the boundary line intersects the separatrix exactly at the center. Noted the reading. Distilled water has a refractive index of 1.3315 at 34˚C. The difference between the reading and 1.33144 gives the error of the instrument.

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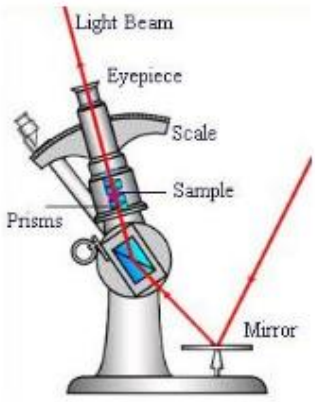

Figure 10: Schematic representation of ABBE refractometer

If the reading is less than 1.3315, the error is minus (-) then the correction is plus (+)if the reading is more, the error is plus (+) and the correction is minus (-). Refractive index of oil is determined using 1 drop of the sample. The correction if any should be applied to the measured reading to get the accurate refractive index. Refractive index of the test samples were measured at 40˚C.

Table no: 5 Refractive index of samples

Sample	Refractive index
Sample 1	1.331
Sample 2	1.331
Sample 3	1.332

Refractive index gives the idea about the viscosity and the density of the substance. The substance with low refractive index will be having low viscosity and density.

Table no: 5 . reveals that the refractive index of the three samples was around 1.33 suggests the low viscosity and density of the sample, which is similar to that of water as it is a distillate of water.

E. Determination of specific gravity

Weight per milliliter – The weight per millilitre of a liquid is the weight in g of 1 ml of a liquid when weighed in air at 25º, unless otherwise specified.

Specific gravity

The specific gravity of a liquid is the weight of a given volume of the liquid at 25º (unless otherwise specified) compared with the weight of an equal volume of water at the same temperature, all weighings being taken in air.

Method

Proceed as described under Wt.Per ml. Obtain the specific gravity of the liquid by dividing the weight of the liquid contained in the pycnometer by the weight of water contained, both determined at 25º unless otherwise directed in the individual monograph.

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Table no:6 Specific gravity of samples

Sample	Specific gravity
Sample 1	1.0006
Sample 2	0.9988
Sample 3	0.9994

Specific gravity suggests the presence of solutes in a solvent. Here solvent is water and volatile oil extracted forms the solute. Specific gravity of is near to the value one suggestive of the sample has specific gravity that is similar to water. Table no: 6 reveals that Specific gravity was almost same for all three samples.

F. Determination of boiling point

Carefully pour the distilled samples into the round bottom flask. Insert the thermometer into the flask, making sure the bulb is fully immersed in the liquid. Apply gentle heat to the sample using the heating source. Monitor the temperature reading on the thermometer. As the sample heats up, observe the temperature at which the liquid starts to boil vigorously. This is the boiling point. Repeat the heating of samples at least twice to ensure acurate results.

Table no: 7 Boiling point of samples

Sample	Boiling point
Sample 1	101^0C
Sample 2	103^0C
Sample 3	102^0C

G. Determination of total ash

Incinerate about 2 to 3 g accurately weighed, of the sample drugs in a tared platinum or silica dish at a temperature not exceeding 450ºuntil free from carbon, cool and weigh.If a carbon free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ash less filter paper, incinerate the residue and filter paper, add the filtrate, evaporate to dryness, and ignite at a temperature not exceeding 450º. Calculate the percentage of ash with reference to the air-dried drug.

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Figure no 11 : *Thriphala curna* processing in Bunsen burner

Figure no 12 : *Lodra curna* processing in Bunsen burner

Figure no 13 : *Shigru pallava churna* processing in Bunsen burner

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Table no: 8 Total ash of samples

Sample	Total ash
THRIPHALA CHURNA	4%
LODRA CHURNA	2.3%
SHIGRUPALLAVA CHURNA	4.38%

H. Determination of acid insoluble ash

The ash obtained as above was boiled for 5 min with 25ml of dilute hydrochloric acid; the insoluble matter was collected on an ash less filter paper, washed with hot water and ignited to constant weight. The percentage of acid-insoluble ash with reference to the air-dried drug was calculated.

Sample	Ash value (Acid insoluble)
THRIPHALA CHURNA	0.7142
LODRA CHURNA	0.3143
SHIGRUPALLAVA CHURNA	0.8125

Table no: 9 Ash value- acid insoluble

I. Determination of water-soluble ash

The ash was boiled for 5 minutes with 25 ml of water; collected insoluble matter in an ash less filter paper, washed with hot water, and ignited for 15 minutes 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. The percentage of water soluble ash with reference to the air-dried drug was calculated.

Table no: 10 Ash value – Water soluble

Sample	Ash value (Water soluble)
THRIPHALA CHURNA	5.86 %
LODRA CHURNA	3.56%
SHIGRU PALLAVA CHURNA	1.3%

J. Determination of water-soluble extractive

5g of coarsely powdered air-dried drug was macerated with 100 ml of water in a closed flask for twenty-four hours, shaking frequently during six hours and allowed to stand for eighteen hours. It was then filtered rapidly, taking precautions against loss of solvent. 25ml of the filtrate was evaporated to dryness in a tared flat bottomed shallow dish at 105°C to constant weight and weighed. The percentage of water-soluble extractive was calculated with reference to the air-dried drug and is represented as % value.

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Table no: 11 Water soluble extractive values

Sample	Water soluble extractive
THRIPHALA CHURNA	41.31%
LODRA CHURNA	15.35%
SHIGRU PALLAVA CHURNA	8.63%

K. Determination of alcohol soluble extractive value

5g of coarsely powdered air-dried drug was macerated with 100ml of alcohol in a closed flask for twenty-four hours, shaking frequently during six hours and allowed to stand for eighteen hours. It was then filtered rapidly; taking precautions against loss of solvent. 25ml of the filtrate was evaporated to dryness in a tared flat-bottomed shallow dish at 105°C to constant weight and weighed. The percentage of alcohol-soluble extractive was calculated with reference to the air dried drug and is represented as% value.

Table no: 12 Alcohol soluble extractive values

Sample	Alcohol soluble extractive
THRIPHALA CHURNA	26.4%
LODRA CHURNA	16.5%
SHIGRU PALLAVA CHURNA	13.20%

Chemical parameters

Due to unavailability, among the chemical parameters, microbiological test was only done.

L. MICROBIOLOGICAL ANALYSIS:

This study was carried out in Rajiv Gandhi Centre for Biotechnology ,Government of India,Thiruvananthapuram.
Sterility culture test for *arka* involve the use of culture media to promote the growth of microorganisms, such as aerobic bacteria, anaerobic bacteria and fungi. Here Fluid thioglycolate medium (FTM) is used to culture anaerobic and some aerobic bacteria.

STEPS:

1.Inoculate the test article into the two types of media
2.Incubate the media for 5 days at different temperatures such as 32.5^0C and 22.5^0C.
3.Examine the media for turbiditty, which may indicate growth.

RESULT:

No growth was observed in three samples during the incubation period. The sample remained clear and sterile, with no visible signs of microbial contamination.

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RGCB
DISCOVERIES FOR A BETTER TOMORROW

MEDICAL LABORATORY SERVICES
Under the Public Health Research and Services Program
(An initiative of Rajiv Gandhi Centre for Biotechnology, Government of India)
Accredited by National Accreditation Board for Hospitals and Healthcare Providers (NABH)

Investigation Report

Name	:	Mr TA	Pat.Id	:	MLS386281
Age/Gender	:	0-Year(s)/Male	Visit No.	:	GHT2439059
Client Name	:	GAC TVM	Registered On	:	19-12-2024 12:31:20
Ref.Dr	:		Collected On	:	19-12-2024 12:33:00
Ex.Patient No	:		Reported On	:	24-12-2024 17:43:20

MICROBIOLOGY

Sterility Culture

Specimen	:	TA
Comments	:	No growth after 5 days of incubation

-- End of Report --

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RGCB-MLS

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It is universally recognized that all investigations results are subject to inherent variability that depends on individual analyte. Laboratory tests may vary depending on age , sex, time of day when the samples is taken, diet, medications etc. Hence all results should be correlated clinically by a competent authority. If your laboratory results fall outside the normal range, it is advised to consult your physician/health care provider before discontinuing, starting or make changes in any treatment plan, including the use of medicine.

Figure no 14: Sterility culture -TA drops

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Investigation Report

Name	:	Mr LA	Pat.Id	:	MLS386275
Age/Gender	:	0-Year(s)/Male	Visit No.	:	GHT2439057
Client Name	:	GAC TVM	Registered On	:	19-12-2024 12:29:35
Ref.Dr	:		Collected On	:	19-12-2024 12:33:00
Ex.Patient No	:		Reported On	:	24-12-2024 17:43:06

MICROBIOLOGY

Sterility Culture

Specimen	:	LA
Comments	:	No growth after 5 days of incubation.

-- End of Report --

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Figure no 15: Sterility culture -LA drops

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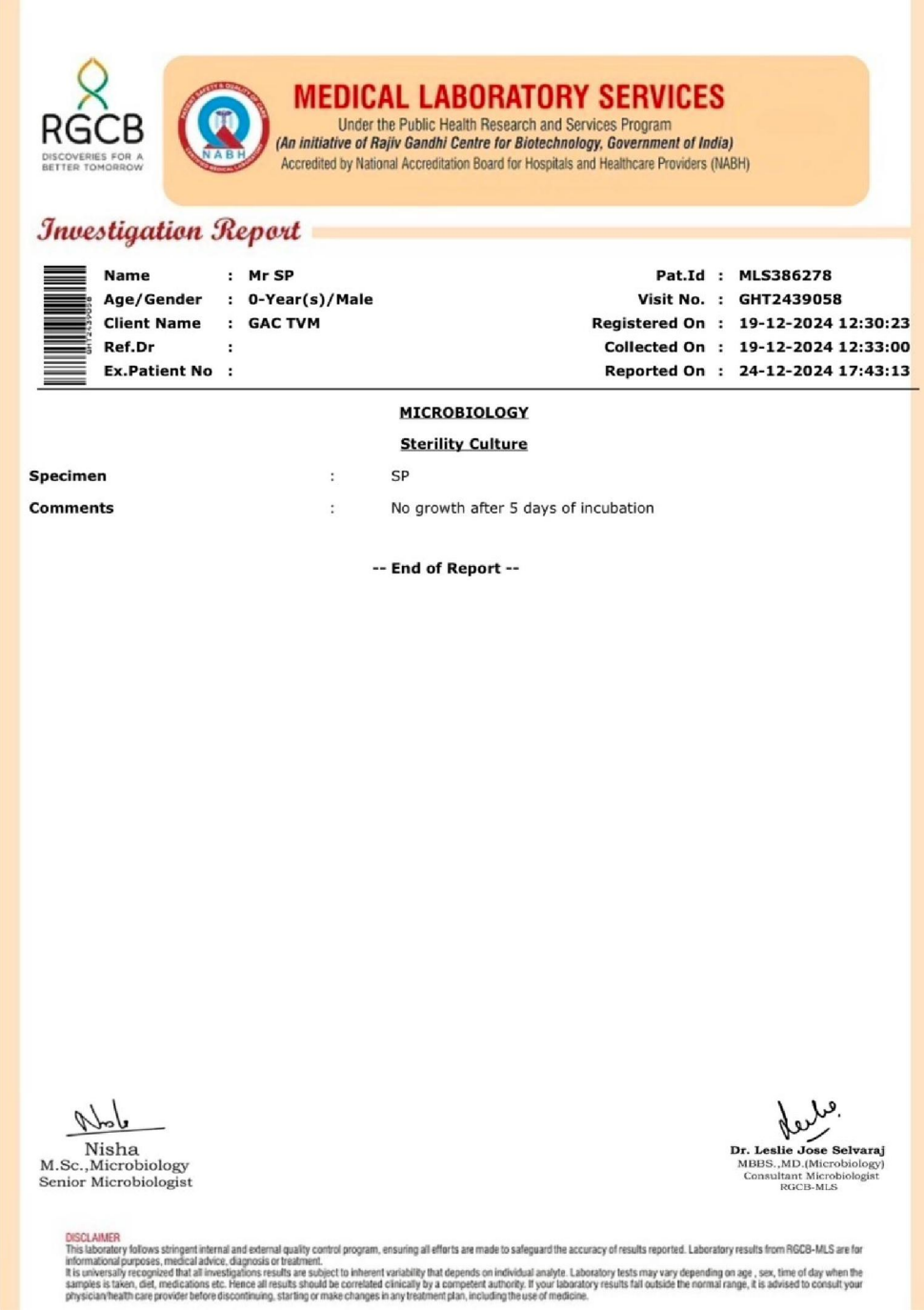

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Investigation Report

Name	:	Mr SP	Pat.Id	:	MLS386278
Age/Gender	:	0-Year(s)/Male	Visit No.	:	GHT2439058
Client Name	:	GAC TVM	Registered On	:	19-12-2024 12:30:23
Ref.Dr	:		Collected On	:	19-12-2024 12:33:00
Ex.Patient No	:		Reported On	:	24-12-2024 17:43:13

MICROBIOLOGY

Sterility Culture

Specimen	:	SP
Comments	:	No growth after 5 days of incubation

-- End of Report --

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Figure no 16: Sterility culture -SP drops

The results were assessed in the following section *Thriphala arka*, *Lodra arka* and *Shigru pallava arka* were subjected to physicochemical analysis.
The results are tabulated in the following table:

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Table no: 13 Results

SL.NO	TEST PARAMETER	*TRIPHALA ARKA*	*LODRA ARKA*	*SHIGRU PALLAVA ARKA*
1	Form	Liquid	Liquid	Liquid
2	Colour	Colourless	Colourless	Colourless
3	Odour	Odourless	Odourless	Odourless
4	Taste	Tasteless	Tasteless	Tasteless
5	Foreign matter (% w/w)	5%	5%	0%
6	Loss on drying (% w/w)	2.6981	0.1209	1.2067
7	PH	7.42	7.37	7.46
8	Refractive index	1.331	1.331	1.332
9	Specific gravity	1.0006	0.9988	0.9994
10	Boiling point	101^0C	103^0C	102^0C
11	Total ash	4%	2.3%	4.38%
12	Acid insoluble ash	0.7142	0.3143	0.8125
13	Water soluble ash	5.86%	3.56%	1.3%
14	Water soluble extractive	41.31%	15.35%	08.63%
15	Alcohol soluble extractive	26.4%	16.5%	13.20%
16	Microbiological test	Nil	Nil	Nil

DISCUSSION

This study is aimed at analyzing critical parameters for quality assurance and control.

Arka is the essence of drugs which possess *teekshna* property. It is *vyavayi*, penetrating and possess pervading quality due to *ushna*, *teekshna*, *laghu* as *agni* and *vayu mahabhoota* dominates in it by virtue of the method of preparation.

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This study was planned with an aim to investigates the phyto-chemical properties of *Thriphala, Lodra and Shigru pallava Arka*. Analysis were carried out at Drug Standardization Unit Government ayurveda college Thiruvananthapuram.

The analytical study was undertaken with an aim to know physico-chemical parameters and their expected values for routine quality control of the below samples:

Sample 1. *Thriphala Arka*

Sample 2. *Lodra arka*

Sample 3. *Shigru pallava Arka*

The pharmaceutical study began with procuring raw drugs from GMP certified nearby pharmacy. Authentication of the drug and quality assessment of the drugs is done at Drug Standardization Unit, Government Ayurveda College Thiruvananthapuram and the same drugs were used for the preparation. The fresh leaves of *shigru* are collected from home.

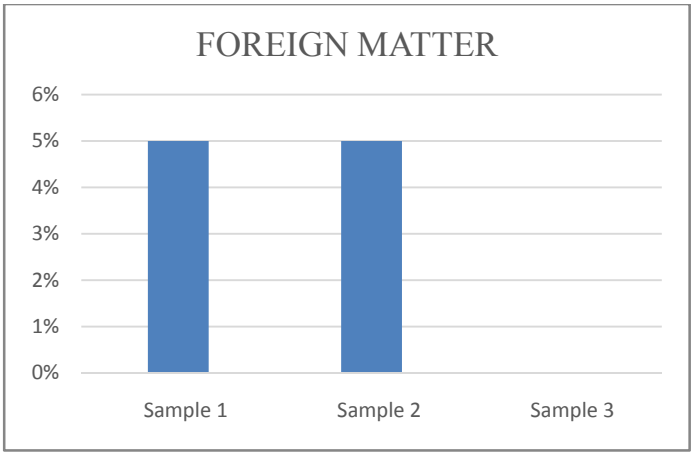
The method of preparation of all three Arka were followed as per the methods mentioned in Ayurveda Formulary of India. As each of the ingredients has different types of volatile contents, we have tried the combination of drug and water in a 1:10 ratio as in sample 1 & 2 and 1:1 in sample 3.

As the preliminary way of standardisation different analytical parameters mentioned for *Arka kalpana* were performed and logical reasoning was carried out. The present analytical study has been carried out to know the quality of the finished products.

Organoleptic characters were alike in all three samples.

Determination of Foreign Matter was found to be 5% in sample 1&2 and 0% in sample 3 which reveals the adulteration is less and within its normal limit.

Graph no: 01 Foreign matter



The LOD value represents the percentage of moisture present in the samples. Here This value is important in assessing the quality and stability of the powder.

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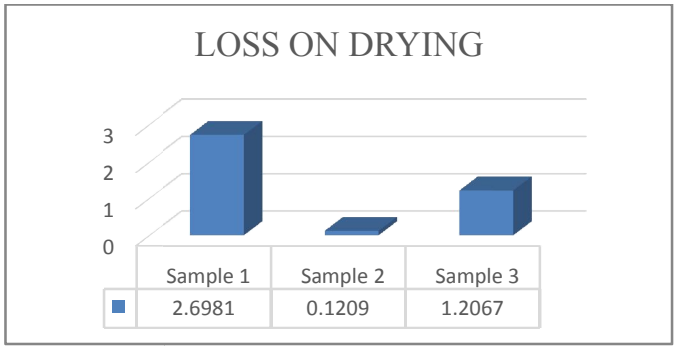
Graph no: 02 Loss on drying



i)The Loss on Drying (LOD) value of *Thriphala churnam* is typically in the range of:
5-10% (Ayurvedic Pharmacopoeia of India)
6-12% (Indian Pharmacopoeia)
7-15% (British Pharmacopoeia)
Here's a general interpretation of LOD values of *triphala churnam*
- Low LOD (< 5%): Indicates low moisture content, which is desirable for stability and shelf-life.
- Moderate LOD (5-10%): Indicates moderate moisture content, which is acceptable for most applications.
- High LOD (> 10%): Indicates high moisture content, which may affect stability, shelf-life, and quality.
By analysing the LOD value of ***thriphala churna*** as **2.6981**, we can conclude that it comes under low LOD and indicates low moisture content, which is desirable for stability and shelf life
ii)The Loss on Drying (LOD) value of *Lodhra churnam* (Symplococus racemosa) is typically in the range of:
6-12% (Ayurvedic Pharmacopoeia of India)
7-15% (Indian Pharmacopoeia)
8-18% (British Pharmacopoeia)
Here's a general interpretation of LOD values of *Lodra churnam*
- Low LOD (< 6%): Indicates low moisture content, which is desirable for stability and shelf-life.
- Moderate LOD (6-12%): Indicates moderate moisture content, which is acceptable for most applications.
- High LOD (> 12%): Indicates high moisture content, which may affect stability, shelf-life, and quality.
By analysing the LOD value of ***Lodra churna*** as **0.1209**,we can conclude that it comes under low LOD and indicates low moisture content, which is desirable for stability and shelf life.
iii) There is no reference about the LOD values of dried leaves of Moringa olifera in API and British pharmacopeia. But there are some reported values of Moringa olifera in Indian journal of pharmaceutical of sciences 2012 (7.4% - 9.4%), Journal of Pharmacy and Pharmacology 2017 (8.5% - 11.2%).By analysing the LOD value of *Shigru pallava churna* as 1.2067, we can assume that it comes under low LOD
The **pH value** indicates whether a given sample is acidic or alkaline. Here the three samples of *arka* was prepared and its pH was determined as part of the study. pH was appeared in similar range for all three samples around 7.5, indicating slightly alkaline in nature of *arka*, as pH influences the rate of oxidation.

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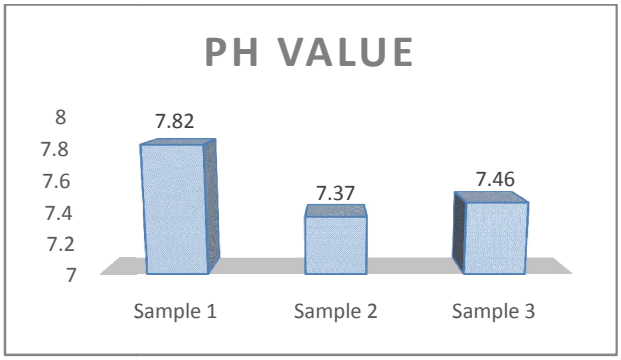
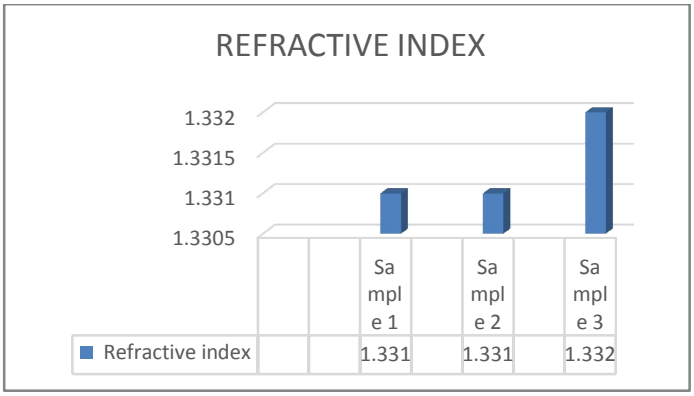
Graph no: 03 pH value



Refractive index indicates how light propagates through that medium, refractive index of water is 1.33, meaning that light travels 1.33 times slower in water than it does in vaccum as *arka* contains some dissolved substances in it the value slightly differed from that of water.

Graph no: 04 Refractive index



Specific gravity of a liquid preparation gives idea about the density it is indicative of concentration of solute in a solvent. The molecular information can be assessed in a non-invasive way by determining the specific gravity. The specific gravity of water is 1.00000 at 20c.Here the specific gravity of 3 samples were very close to the value of water. Based on various studies and pharmacopeial standards, the typical specific gravity range of

Thriphala kashaya :
0.990-1.020 (Ayurvedic Pharmacopoeia of India)
0.985-1.015 (Indian Pharmacopoeia)
0.980-1.010 (British Pharmacopoeia)
Lodhra Kashaya :
0.995-1.025 (Ayurvedic Pharmacopoeia of India)
0.990-1.020 (Indian Pharmacopoeia)
0.985-1.015 (British Pharmacopoeia)
Shigru panchagna Kashaya:
0.998-1.012 (Ayurvedic Pharmacopoeia of India)
0.995-1.010 (Indian Pharmacopoeia)
0.992-1.008 (British Pharmacopoeia)

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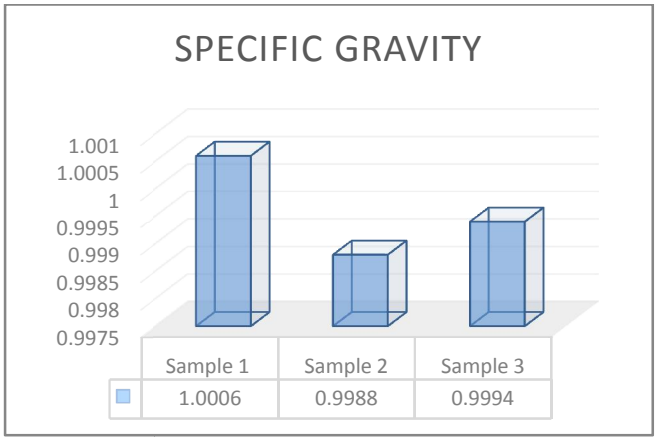
Graph no: 05 Specific gravity



The specific gravity analysis of three arkas revealed the following values:
- *Thriphala Arka*: **1.006**
- *Lodra Arka*: **0.9988**
- *Shigrupallava Arka*: **0.9994**

These values fall within the normal range, indicating that the density and viscosity of the arkas are within acceptable limits.

Boiling point is the temperature at which the liquid start boiling, ith has its effect on disssoved substances present in a liquid. Here the three samples having the boililng point of around 100 – 103^{0}C which is almost equivalent to water. The reason behind it may be the arka contains mostly water and no other liquids were added to it.

Ash values are used to determine the quality and purity of crude drugs especially powders. The total ash content of a medicinal plant indicates how many minerals it contains and how much foreign material has been mixed in. Ayurvedic pharmacopoeia of India (2016) specifies the ash value of

Thriphala churna - not more than 5%

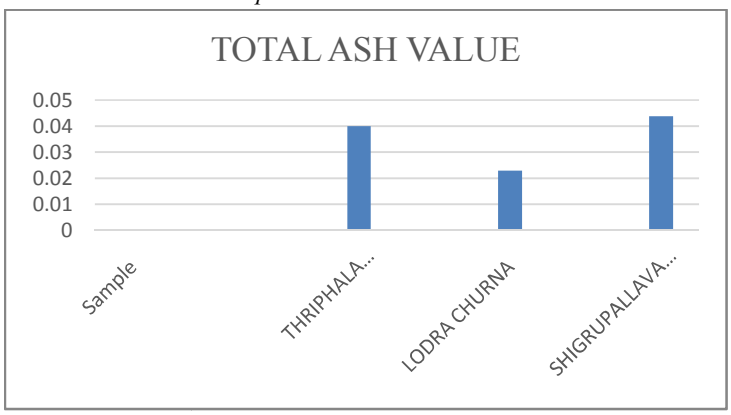
Lodhra churna -not more than 12%

Shigrupallava churna - not morethan 12%

Here the total ash value of *Thriphala churnam* is **4%,** *Lodra* – **2.3%** and *Shigrupallava churna* – **4.38%**

These values fall within the normal range indicating the quality and purity of the drugs are within acceptable limits.

Graph no: 06 Total ash value



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Acid insoluble ash value is a crucial metric used tom assess the quality and purity of herbal formulations. It measures the portion of ash that does not dissolve in acid indicating the presence certain minerals and impurities, as well as siliceous materials in the sample. This value represents the inorganic residue remaining total ash treatment, helping to evaluate potential adulteration and the overall quality of crude drug samples.

Normal Acid insoluble ash values mentioned in Ayurveda pharmacopoeia:

Thriphala churna – not more than 1%

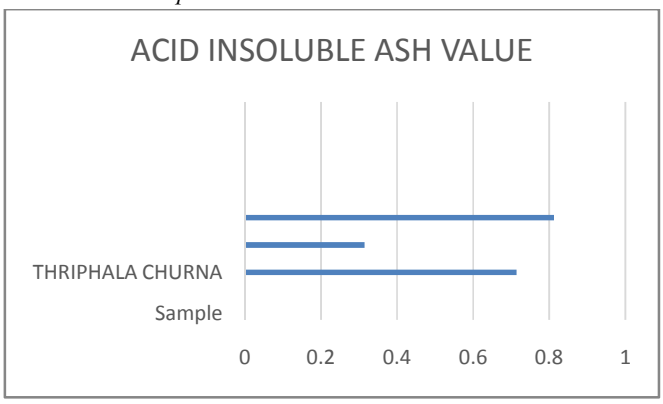
Lodhra churna – not more than 1%

Shigru pallavachurna – not more than 2%

Here the total acid insoluble ash value of *Thriphala churnam* is **0.7142%,** *Lodra* – **0.3143%** and *Shigrupallava churna* – **0.8125%.**

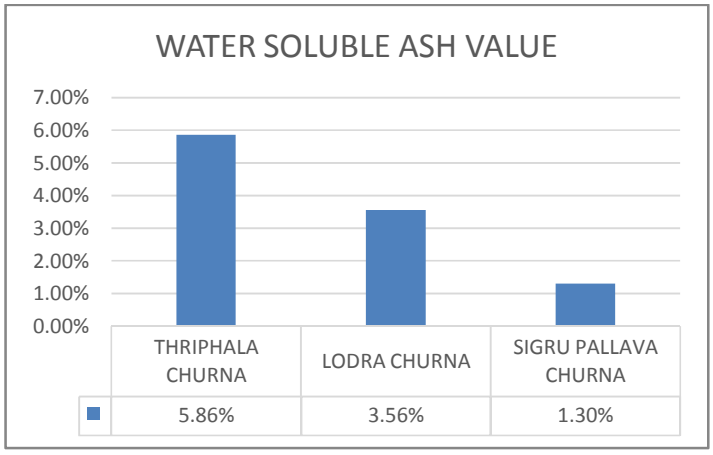
These values are within the acceptable limits, confirming that the quality and purity of the drugs meet the required standards.

Graph no: 07 Acid insoluble ash value



Water soluble ash value is a measure of the amount of inorganic material that is presnt in the plant ash. This value is important because it can help to determine the extracting values of plant ash. The values of three samples are **(*Thriphala churna* – 5.86%, *Lodhra churna* – 3.56% and *Shigrupallava* churna – 1.3% respectively).**

Graph no: 08 Water soluble ash value



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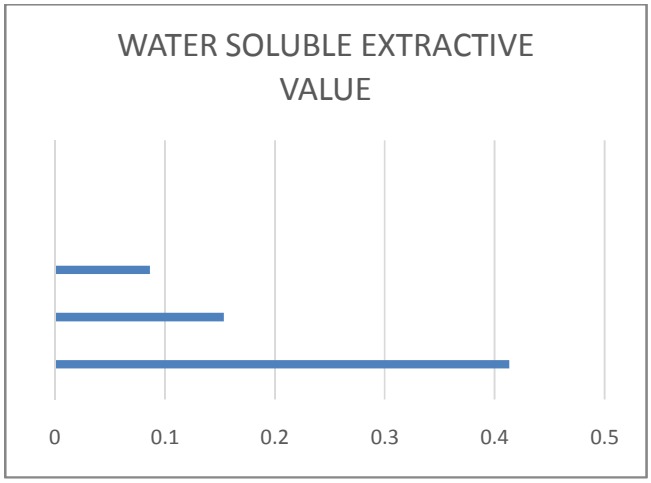
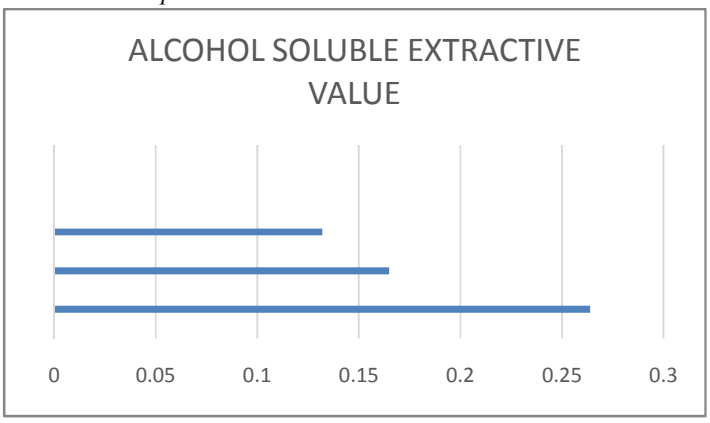
Water soluble extractive value plays an important role in evaluation of crude drugs.Less extractive value indicates addition of exhausted material,adulteration or incorrect processing during drying or storage or formulating. The values of three samples are ***Thriphala churna* -41.31%,*lodhra churna* -15.35% and *Shigru pallava* churna -08.63 %.**

Graph no: 09 Water soluble extractive value



Alcohol soluble extractive value is a measure of the amount of extractive matter present in a plant material that is soluble in alcohol.It is an important parameter in the quality of herbal medicines and botanicals.The values of three samples are ***Thriphala churna*-26.4%, *Lodhra churna*- 16.5% and *Shigru pallava churna*-13.20%.**

Graph no: 10 Alcohol soluble extractive value



Due to unavailability, only microbiological study of the chemical tests were performed.

Microbiological analysis:

The samples were found to be sterile,with no microbial growth observed during the incubation period .The test results indicate that the samples are free from contamination and meets the required sterility standards.

II. CONCLUSION

Arka Kalpana from *Bhaishajya Kalpana* 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*. *Arka prakasha* , main authentic text still elaborates all aspects of its preparation right from collecting good quality raw drug to proper water quantity required

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for soaking ,to right amount of heat which will be required for its preparation. And finally, *Prashastha Arka Lakshana* tests the prepared Arka for its quality and purity.

Here the analytic parameters were within the parameters mentioned in API and where suggestive of the genuine of the raw materials and the quality of the end product obtained. Physicochemical parameters of the three samples such as loss on drying, ph, specific gravity, acid insoluble ash, alcohol soluble extractive etc and organoleptic characteristics can be effectively used for the pharmaceutical analysis of samples.

Based on the results of both physical and chemical tests that were performed, the three samples were appears to meet the standards specified in the API. However, due to limited number of tests conducted, it is not possible to make a comprehensive assessment of the sample's quality. Based on the results of the sterility test, it can be concluded that the samples are sterile and free from any dectectable microorganisms. The absence of growth indicates that the samples meet the sterility requirements and is suitable for use.

Importance of *Arka Kalpana* can be explained in terms of better shelf life than *swarasa, kalka, kwatha, aschyotana, anjana* etc easier in administration in patients who don't like to take *churna, kwatha, aschyotana, Anjana* and also for *mridu prakriti* people. *Arka* is prepared by combination of *Jala* and *Agni* hence it is *laghupaki, vyavayi* and *vikasi* in its *gunas*.

It is necessary to conduct pharmaceutical analysis of drugs used in *Aschyotana*, which is widely used in practice, to ensure its safety and quality. Detailed Pharmacological evaluations are required to fully understand its properties, potential interactions, and therapeutic effects.

This will help to establish stronger scientific basis for its application in various medical treatments.

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