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REVIEW OF ARKA KALPANA & IT'S RECENT ADVANCES IN PHARMACEUTICS

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ABSTRACT

Bhaishajya kalpana is the branch of Ayurveda which primarily deals with the different kinds of dosage form and their therapeutic utility. Among the large number of formulations specified by Acharya, the panchvidha kasaya kalpana have great importance, as they form the primary or basic dosage forms, from which other secondary dosage forms are prepared. Arka kalpana is a very unique formulation in ayurvedic pharamaceutics for its method of preparation and efficacy. According to Ravana's Arka Prakasha, the Panchvidha kashay kalpana include Kalka, Choorna, Rasa, Taila and Arka. Arka kalpana is given specific importance and it opines that it has more potency in comparison to the other kalpanas. It is most potent due to dosharahithatva and its specific gunas. Arka kalpana is now days famous kalpana among the ayurvedic procedures. It is introduced in Ayurvedic pharmacy in later part of samhita period, which is very specific in its mode of preparation and therapeutic effect. So there arises a need to know the simplified procedures and methodologies involved in the preparation of this formulation which can be easily understandable and applicable both in industrial level as well as testing scientific laboratories.

KEYWORDS: It is most potent due to dosharahithatva and its specific gunas.

INTRODUCTION

Ayurveda is a science of life and serve to mankind since a long period. The object of Ayurveda is preventing as well as curing the disease. Therefore different formulations or dosage forms are evolved from time to time according to need. The idea behind the

preparation of different dosage form is to make more suitable to the body for better absoption and assimilation. The word Arka is derived from 'Ru – gatau'.[1]

Every word contains meanings. Gati (motion), denotes three different meanings i.e. Gyan, Gaman and prapti. In Arka process all these three meaning are to be accepted, as the knowledge of the contents of the drug is first thing (i.e. Gyan) then the motion is given to the contents through water (i.e. Gaman) and lastly required amount of active content is obtained (i.e. prapti). Thus Arka contains the complete aspect of its manufacting process by root word 'Ru-Gatau.' In ayurveda kalpana means various dosage forms.[2]

Every dravya can be a medicine but some pharmaceutical procedures are done to change or potentiate its original properties. The basic idea behind the administration of drug is to make it more suitable to the body elements. Arka kalpana can be defined as a liquid preparation obtained by distillation of certain liquids or of drugs soaked in water using the Arkayantra or any convenient modern distillation apparatus. The concept of arka as a dosage form can be seen in different texts but the pharmaceutical aspect of Arka kalpana is mentioned in detail mainly in Ravana's Arka praksha.[3]

Importance of the Arkas

dravya kalpah panchdhasyat kalka churna rasastatha tailamarka kramatgneyam yathottargunam priye {a. p\ 1/46}.[4]

According to the above reference the efficacy of Kalka, Churna, Swarasa, Taila and Arka is gradually increasing in descending order. This efficacy of individual formulation is may be due to various degrees in the concentration of active principle. This implies that the author of Arka-Prakash has said this on the basis of concentration of drug in formulations. Other importances of this Kalpana 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 is prepared by the combination of Jala and with the help of Agni; hence Arkas are Laghupaki, Vyavayi and Vikasi & thus assimilates quickly in the body.

3. Arkas have good palatability.

4. Arka Kalpana acquires highest position in obtaining the potentially active volatile oils as the condensation takes place during the process of distillation.

LITERARY REVIEW

Samhita kala

References about Arka kalpana are not available in any samhita .Usage of arkas may not be popular during that period.

Adhunika kala

- It is first mentioned in Gad Nigraha by Acharya Shodhal in 12th century.
- It is widely described by Ravana in his book Arka prakasha. In this book, different ratios for distilling, reference for 196 single drugs and 192 aushada yogas for preparation of Arka with their indication is described with details about Varuni Yantra for preparation of arka.
- In Ayurved Sar Sangrah, there are 25 Ark+-has explained with their ingredients, method of Review Article wjpls, 2020, Vol. 6, Issue 4, 116-119 ISSN 2454-2229 World Journal of Pharmaceutical and Life Sciences WJPLS www.wjpls.org SJIF Impact Factor: 6.129

2. Classification of Arka

A. Classification as per contents

1) *Gandha Arka*: Extracting Arka from the drugs containing volatile oil or fragrance e.g: Ajmoda, etc.

2) *Sthira Arka*: Extracting Arka from the drugs not containing Volatile oil e.g: Triphala, etc.

3) *Drava Arka*: Extracting Arka from the drugs that are liquid in state. E.g. Gomutra ark, etc.

B. Classification based on duration of preparation.

1) *Shreshtha Arka*: It is prepared in 9 Hrs.

2) *Nyune*: It is prepared in 3 Hrs.

3) *Madhya Arka*: It is prepared in 6 Hrs.

C. Classification based on the part used:

1) Visha varga arka

2) Sugandha gan arka

3) Tandul arka

4) Satu dhanyaarka

5) Kshirivriksha arka

6) Tail dhanya arka

7) Pushp arka

3) Agni distribution in Arka preparation

We use six different types of Agni for preparation of Agni. Dipagni, Dhumagni, Madhyamagni, Mandagni, Bhttagni and Kharagni.

Arka is firstly given dhumagni for one and half hours, followed by dipagni for next one and half hours. Then half hour mandagni, 45 minutes madhyamgni and kharagni are given.

4) Different method of preparation of Arkas[8]

Sr. no.	Type of drug	Quantity of Water	Examples
1	Atyanta kathina	3 parts	Chandana
2	Kathina (hard Drugs)	2 parts	Ajmoda
3	Sarasa nala (stem with juice)	1/20 part	Nirgundi Eranda
4	Patra (leaves)	1/100 th part	Vasa
5	Nirasa (devoid of juice)	1/20 th part	Vata,Ashvatha
6	Mridu dugdhika (mild latex)	4 part	Dugdhika
7	Tiksna dugdhika	10 part	Satala
8	Phala (fruit)	0 part	Amra
9	Atipakwa phala (very Ripe fruit)	0 part	Kadali
10	Puspa (fiower)	1/16 th part	Gulab Arka
11	Katu phala	1/40 th part	Pippali
12	Drava dravya (liduids	) O part	Gomutra

MATERIAL AND METHODS

The details of the method of preparation of Arka kalpana is taken from Ravana's Arka prakash.

Equipments required.[5]

Following equipments are required for preparation of Arka.

1. Chulla – Angi or stove.
2. Lakadi – coal along with kerosene oil.
3. Dravya – oushadha dravya, medicine.
4. Patra – Glass bottles.
5. Yantra – Bhakka yantra, Varuni yantra, Tiryak patina yantra, Karanambika Arka yantra and Nadika yantra.
6. Arka sangrahara patra[6]

Method of preparation of Arka

Arka prakasha of Ravana clearly mentions the pharmaceutical aspects of arka kalpana with much detail. The text explains the general method of arka preparation which is as follows. The required quantity of water is added to the drugs for soaking and kept overnight. Next day

morning it is poured into the arka yantra and the remaining water was added and boiled. The vapours get condensed and collected in a receiver. In recent books it is mentioned as drugs are soaked and kept overnight. Eight times of water must be added. Madhyagni (moderate fire) or Teevra agni (extreme fire) must be maintained during the procedure and only two third of the poured liquid must be collected.

Arka is extracted from two ways – 1.wet drugs 2. Dry drugs.[7]

If the drugs are *soft and wet* then 6 times of water should be added to the quantity of wet drug and extraction of Arka should be done up to 60 %.

If the drugs are *wet and mildly hard* then 8 times of water should be added to it and extraction of Arka should be done up to 60 % - 70 %.

If the drugs are *dry and soft* they need not to be crushed. At the time of extraction they should be mixed with 6 -8 times of water in the vabaka yantra and usage of mild fire for obtaining 60 % - 70 % of arka.

If the drugs are *dry and hard* then these are crushed into coarse powder form and soaked in 10 times of water for overnight, in the morning it should be placed in the vabaka yantra and mild fire for obtaining 60 % - 70 % of arka.

If the drugs are *dry and moderatrly hard* they need not to be crushed and 8 times of water is added to it and kept for overnight and in the morning it should be placed in vabaka yantra and mild fire for obtaining 60 % of Arka.

Modern view Process of Distillation[9] [10]

According to Modern Science it is known as process of distillation. In the process of distillation condenser is mounted in the neck of the flask containing the material being treated. As vaporization occurs, the vapours enters the condenser, the pressure of the vapors causes the distillate to spurt out from it. At the same time, a certain amount of back pressure is produced by the presence of the liquid retained in the condenser and this interrupts the smooth progress of the distillation process. Distillation consists of two steps A. Evaporation B. Condensation.

A. Evaporation

Evaporation may be defined as the free escape of vapours from the surface of a liquid. It should be distinguished from boiling or ebullition, which takes place at one temperature only for a given pressure. The kinetic theory of matter assists us to understand how evaporation takes place at any temperature and from the surface of a liquid only. It is presumed that the

molecules of a liquid are always in motion, moving higher and higher at enormous speeds, frequently colliding. The molecules of a liquid are believed to exert an attractive force upon each other. It will be seen that the kinetic theory affords an explanation of the fact that when a liquid is allowed to evaporate without being heated it gradually becomes cooler. This is because the molecules with the highest velocity be seen therefore, that if it is desired to change a liquid into a vapour without fall of in temperature, heat must be suppied. This heat is called latent heat of vaporization and when the vapour returns to the liquid state the latent heat is evolved as sensible heat.1 gm of water at 100 0 c may be converted into water vapour (at normal atomospheric pressure) of the same temperature ,the expenditure of 537 cal. Of the heat energy is required.

B. Condensation

Condensation is the reverse process of evaporation or vaporization. It will be recalled that, in order that 1 gm of water at 1000 c may be converted into water vapour (at normal atomspheric pressure) of the same temperature, the expenditure of 537 cal. of heat energy is required, accordingly when water vapour is condensed by cooling.

BHAISHAJYA MARGA (ROUTE OF DRUG ADMINISTRATION) FOR ARKA

Arka can be used for Paan, Swedan, Nasya, Gandusha, Anjana, Lepa, Dhupana And Karna Purana. In Panchamshatakama of Arkaprakasha granth, various modes of administration are mentioned according to various diseases. In most of the diseases Arka is advised for paan. For Daahnashanlepa of Arka is advised. For Bhootonmadnasya, Anjana, lepa, paan is advised. For Apsmarnasya, karnapurana, Anjana, paan etc advised.

DOSE[15], [16]

In AFI and API dose 12-24 ml is mentioned for most of Arkas when taken orally.

ANUPAN[17]

Anupan is vehicle of medicine. It increases absorption and effect of medicine. Various Anupan like jal, madhu, milk is mentioned. But Arka is usually mixed with equal quantity of water before use.

ARKAPANOTTAR KARMA

After Arka sevan, Tambulbhakshan is advised by Arkaprakash. If tambul is not available then lavang or clove should be consumed.

SHELF LIFE

According to drug and cosmetic act 1945-16B, 6th amendment, shelf life of Arka is 1 year.

ARKA GRAHAM PATRA /STORAGE OF ARKA

Arka must be stoared in Jeernasthimrittikapatra, Glass bottles or stone bottles. If these three are not available then mrittikapatra should be used.

Characteristic of Arka

- Taste as per original drug.
- Transparent and clear.
- Odour as per original drug.

Precautions

- It must maintain medium flame.
- Cool water must be placed in upper area and water must be changed periodically.
- If the drug content is soaked in presence of sunlight, then 4 times of water is added to it.
- Arka yantra is completely sealed with the help of clays.

Different Arka Formulations[11] [12] [13]

Sr.No	Formulation	Dose	Reference	Disease
1.	Ajamoda Arka	12-24 ml	Arkaprakasha, Sataka 3	Agnimandya (digestive impairment), Ajeerna (dyspepsia), Vastiroga (disease of urinary system)etc
2.	Karpuradyarka	6-12 ml	Arkaprakasha, Sataka 4	Agnimandya (digestive impairment), Hrudroga (heart disease), Medoroga (obesity) etc
3.	Jatamansyarka	12-24 ml	Arkaprakasha, Sataka 4	Agnimandya (digestive impairment), Unmada (mania/psycosis), Apasmara (epilepsy) etc
4.	Shatapusparka	12-24 ml	Arkaprakasha, Sataka 3	Agnimandya (digestive impairment), Adhmana (flatulence with gurgling sound) , Shula (abdominal pain) etc
5.	Pudinarka	10-25 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Chhardi, Ajeerna (dyspepsia), Udarasula (abdominalpain) etc
6.	Yavanayarka	10-25 ml	Arkaprakasha,Sataka 3	Trikasula (pain in sacroiliac region), Agnimandya (digestive impairment), etc
7.	Kakamachyarka	10-20 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Hridroga (heart disease), (Yakritroga liver disease), Udara roga (disorders of abdomen), Kamala (jaundice)etc
8.	Kiratatiktarka	25-50 ml	AyurvedaSara Samgraha,	Jwara (fever), Pandu (anaemia), Raktapitta (bleeding disorder) etc

			(Arkaprakarana)	
9.	Triphalarka	20-50 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Prameha (increased frequency and turbidity of urine), Medobrudhi (obesity), Pandu (anaemia), Vibandha (constipation)etc
10.	Dasamularka	20-50 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Vatavikara (disease due to vata dosa), Sutika roga (puerperal disease) Shotha (inflammation), Gulma(abdominal lump) etc
11.	Gulabarka	10-20 ml	API,Part-II,Vol-3	Daha (burning ensation),Trisna (thirst), Hrullasa (nausea) etc
12.	Chandanadyarka	30-60 ml	AFI , Part-III, 2:5	Paitikadaha (burning sensation due to pitta dosa), Jwara (fever), Daha (burning sensation) etc
13.	Guduchyarka	20-50 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Amavata (rheumatoid arthritis), Vatarakta (gout), Jwara (fever), Raktapitta (bleeding disorder) etc
14.	Nilodupusparka	10-20 ml	AFI , Part-III, 2:8	Kasa (cough), Swasa (asthma) etc Purnendu Panda et al: Arka Kalpana & Its Importance In Ayurveda IAMJ: Volume 7, Issue 3, March - 2019 (www.iamj.in) Page 417 1
15.	Parpatarka	10-20 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Jwara (fever), Atisara (diarrhoea), Daha (burning sensation), Vicharchika (eczeema),
16.	Punarnavarka	10-20 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Shotha (inflammation), pandu (anaemia), Udara roga (disorders of abdomen), Yakrut Shotha (hepatomegaly)etc
17.	Bramhyarka	10-20 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Budhimandata (low intelligence), Smruti bhrama (disturbed memory), Pralapa (delirium) etc
18.	Munditiktarka	10- 20 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Pliharoga (splinic disorders), Prameha (increased frequency and turbidity of urine), Vatavyadhi (disease due to vata dosa), Twakroga (skin diseases) etc
19.	Vanyajamodarka	10-20 ml	AFI , Part-III, 2:13	Agnimandya (digestive impairment), Ajeerna (dyspepsia), etc
20.	Satahyarka	10-20 ml	AyurvedaSara Samgraha, (Arkaprakarana)	Jwara (fever), Agnimandya (digestive impairment),, Atisara (diarrhea)etc

STANDARDIZATION OF ARK

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.Shankhkundendudhavalo : 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 aerugiosa.
- Aflatoxins-B1,B2,G1,G2.
- Shelf life.

DISCUSSION

Arka kalpana is one of the most sought after formulation in this modern age. Many number of dosage forms are being converted to Arka due to its reduced dose, patient compliance and inceased potency. We find many references regarding the pharmaceutic aspects of Arka kalpana in different literatures like A.F.I., Ayurveda sara sangraha, Gadanigraha, Rasatantrasara and Siddhaprayogasangraha, etc. A detailed explanation regarding all the aspects in the manufacture of Arka is seen in Arka prakasha by Ravana. Seven different types of classification of Arka are mentioned in different literatures. They are based on contents, part used, duration of preparation, action on doshas, rutus and disease. On close examination we see that the Arka yantra told in the classics and the modern day distillation apparatus are following same principles of science i.e. distillation which clearly states the significance of the detailed procedures explained.

CONCLUSION

Arka kalpana from Bhaishajyakalpana 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. 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 combimation 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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