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# STUDY OF KSHEERPAK KALPANA PHARMACEUTICO ANALYTICALLY WITH SPECIAL REFERENCE TO ARJUNA KSHEERPAK

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## ABSTRACT

**Introduction:** *Ksheerpaak kalpana* is one of the most important pharmaceutical preparations of Ayurveda. It is a preparation where milk is the media of administration, usually *Kashaya rasa pradhan* (astringent) and *Tikshna* drugs are selected intension behind this is to bring down *Tikshnata* and to mask the *Kashayatva* of the drug, with the help of *Madhura rasa* & *Madhura vipaak* of milk. The principles of preparation of *Ksheerpaak kalpana* is well designed by the Ancient Acharyas and these have been used as nutritive and as medicine in many diseased conditions viz. Arjun Ksheerpaak, Lashun Ksheerpaak etc. **Aim -** "To Study Ksheerpak kalpana pharmaceutico analytically with special reference to Arjuna ksheerpak." **Objective-**1) To prepare Arjuna ksheerpak with standard operating procedure (SOP) according to Sharangdhar Samhita (1:8:32), Ashtang Sangraha (1:4:16), Dravyaguna by Acharya Yadavji Trikamji (1:15:15) and Chakradatta (1:4:4). 2) To Compare and analyse all these Arjuna ksheerpakas. **Result-** The Ksheerapaka prepared by four different methods and analysed by Physico-chemical parameters and HPTLC. **Conclusion-**Presence of Macro-Nutritional values, Arjun ksheerpak prepared by Yadavji Trikumji (AKYT) was better. Presence of arjunic acid by HPTLC study, presence of micro nutrients, Arjun ksheerpak prepared by Chakradtta was better (AKCD)

**KEYWORDS:** Ayurveda, Ksheerpaak, Pharmaceuticals.

## INTRODUCTION

In Ayurveda “Bheshajya Kalpana,” ie. an Ayurvedic Pharmaceutical science, comprises two words Bheshajya and Kalpana. Bheshaja can be taken in attention with the trifold application i.e. pharmacognostic, pharmaceutical approach and approach of therapeutic management. Kalpana or the formulations are performed to potentiate properties of drugs. This branch contributed to aid the physician to utilize this Bheshajya in various forms and styles to battle the disease, enhance immunity and also maintain health.

Bhaishajya Kalpana deals with the medicinal preparations, they are basically divided into Panchavidha kashaya kalpana, ie Swarasa, Kalka, Kwatha, Hima and Phanta[1] and other preparations like Churna, Vati, Sneha, Asavarishta and Avaleha Kalpana.

Ksheerpaak kalpana is one of them which is the Upkalpana of kwatha providing itself as the best drug by competing and conquering needs of palatability along with nutrition to be provided during the course of disease.

Ksheerpaka kalpana can be termed as “Medicated milk” which is prepared by boiling the milk with drug and water until only milk part remains and thus it can also be called as “Milk Decoction”. References of Ksheerpak are available in Sharangdhar samhita, Ashtang sangraha, Dravyaguna vidyana, Charak samhita and Chakradatta.

The term ksheerpaak kalpana is sum of words ksheerapaak and Kalpana, where ksheerpaak means milk is to be processed with the medicinal drugs and water till the milk remains as end product. This can be given in all ages. It is recognized as an ingredient of balanced drug /diet. This process ensures absorption of active therapeutic properties of ingredients which are used.

Ksheer is renowned as aajanmyasaatmya dravya[2] as described by Ayurveda; it also has Jeevaniya, Rasayana property which helps in rejuvenation of Dhatus that gets vitiated by doshas. It is easy to administer in all age groups. Hence Ksheerpak Kalpana proves more beneficial as it is having medicinal as well nutritional values, important one is that the Ksheer used in this kalpana acts as a solvent for maximum extraction from the raw drug and enhance its properties.

Ksheerpak is the formulation which is indicated under "Hrudrogadhikar" in the text of Sharangdhar Samhita, Chakradatta, Ashtang Hrudaya, Yogratnakar, Bharat Baishajya

Ratnakar, Gadanigraha and Bhaishajya Ratnavali etc.

The procedure of Ksheerpak Kalpana is somehow different in above texts.

**Qualities of Ksheerpak Kalpana**

The qualities of Ksheerpak Kalpana over other medicaments are as follows:

1. Easy to administration
2. Pleasant and agreeable taste
3. Safe in use
4. High therapeutic efficacy
5. Economic
6. Accepted by all age groups
7. Easy to prepare
8. Milk media brings down the tikshnatva of the drugs used.
9. Digestion, absorption and assimilation of the milk fat present in colloidal form will be slow, which in turn minimizes toxic effects of tikshna dravyas and help in enhancing its medicinal effect.
10. It masks unpalatability and unwanted effects of kashaya rasa present in the drugs with the madhura rasa and madhur vipaka of milk media.
11. Milk is rich in protein and calcium will be a good nutrition .so along with the medical value even nutritional balance is also maintained by these preparations.
12. While preparation of ksheerpaka water soluble as well as fat /protein soluble active ingredients get into media.

**AIM**

This research article aims **"**To study Ksheerpak kalpana pharmaceutico analytically with special reference to Arjuna ksheerpak."

**OBJECTIVES**

1) To prepare Arjuna ksheerpak with standard operating procedure (SOP) according to Sharangdhar Samhita (1:8:32), Ashtang Sangraha (1:4:16)., Dravyaguna by Acharya Yadavji Trikamji (1:15:15) and Chakradatta (1:4:4).
2) To analyse and Compare all these Arjuna ksheerpakas.

## MATERIAL

As per the Ayurvedic Pharmaceutics Ksheerpak Kalpana needs following materials;

1. Churna dravyas (Drugs for powder / pulp) - Arjuna bark was purchased from approved pharmacy and drug authentication was done from approved laboratory.
2. Godugdha (Milk) - Cow's milk was purchased from approved dairy
3. Water

## METHODOLOGY

Ksheerapaka is prepared by boiling the required amount of bharad choorna of drug, with the required amount of Ksheera (Milk) and Jala (Water) until only milk part remains as end product. This procedure should be carried out under Mandagni (mild fire). The quantity of bharad choorna, milk and water varies according to Acharyas. As per Aracharya Charak, Yadavji Trikamji, Sharangdhar and Chakradatta, all the three ingredients should be added at the same time and then mandagni (low flame) should be given for preparation of ksheerpak. In Bharat Bhaishajya Ratnakar, Yogratnakar, Bhaishajya ratnavali, Gadanigraha it has mentioned the same procedure. On the other hand Acharya Vrudha Vaghbhat has mentioned to prepare kwatha (decoction) first and then equal quantity of ksheer (milk) is to be added.

Ksheerpak should be prepared on mandagni.[3] The proportion of dravya and water should be taken as 1:16 and boiled till 1/4$^{th}$ part remains. It means 4 parts of decoction will be prepared and then equal part of milk i.e. 4 parts of milk should be added till the only milk part remains as end product.

The proportion of bharad choorna, milk and water as per acharyas is mentioned as below:

**Table no. 1: Combined reference of Proportion of Arjuna powder, Cow's milk and water according to Classical Texts.**

| Reference | Sharangdhar | Ashtang sangraha (Vru.Va) | Dravyaguna (Ya. Tri) | Charak and Chakradatta |
|---|---|---|---|---|
| Arjuna Bark Powder | 1 part | 1 part | 1 part | 1 part |
| Cow's Milk | 8 parts | 4 parts | 15 part | 4 parts |
| Water | 32 parts | 16 parts | 15 part | 4 parts |

**Method-1: Arjuna Ksheerpak nirman according to Sharangdhar Samhita (AKSS)[4]**

**Table no. 2: Showing ingredients with proportion of Arjuna ksheerpak.**

| Sr.No | Ingredients | Latin name | Parts used | Proportion |
|---|---|---|---|---|
| 1 | Arjuna | *Terminalia arjuna* | Bark | 10 gm |
| 2 | Ksheera | Cow's Milk | Whole | 80 ml |
| 3 | Jala | Water | Whole | 320 ml |

**Method-2: Arjuna Ksheerpak nirman according to to Ashtang Sangraha (AKAS)[3]**

**Table no. 3: Showing ingredients with proportion of Arjuna ksheerpak.**

| Sr. No. | Ingredients | Latin name | Parts used | Proportion |
|---|---|---|---|---|
| 1 | Arjuna | *Terminalia arjuna* | Bark | 10 gms |
| 2 | Ksheera | Cow's Milk | Whole | 40 ml |
| 3 | Jala | Water | Whole | 160 ml |

**Method-3: Arjuna Ksheerpak nirman according to Dravyaguna by Acharya Yadavji Trikamji (AKYT)[5]**

**Table no. 4: Showing ingredients with proportion of Arjuna ksheerpak.**

| Sr.No | Ingredients | Latin name | Parts used | Proportion |
|---|---|---|---|---|
| 1 | Arjuna | *Terminalia arjuna* | Bark | 10 gms |
| 2 | Ksheera | Cow's Milk | Whole | 150 ml |
| 3 | Jala | Water | Whole | 150 ml |

**Method-4: Arjuna Ksheerpak nirman according to Chakradatta (AKCD)[6]**

**Table no. 5: Showing ingredients with proportion of Arjuna ksheerpak.**

| Sr. No. | Ingredients | Latin name | Parts used | Proportion |
|---|---|---|---|---|
| 1 | Arjuna | *Terminalia arjuna* | Bark | 10gms |
| 2 | Ksheera | Cow's Milk | Whole | 40 ml |
| 3 | Jala | Water | Whole | 40 ml |

## OBSERVATIONS AND RESULTS

The obtained observations and results are presented in the following tables.

**Table 6: Comparative final end product of four different Arjuna ksheerpakas.**

| Contents & yield | Method | | | |
|---|---|---|---|---|
| | Sha.sa (AKSS) | Ashtang Sangraha (AKAS) | Dravyagun vidnyana (AKYT) | Chakradatta (AKCD) |
| Arjuna (gm) | 10 | 10 | 10 | 10 |
| Ksheera (ml) | 80 | 40 | 150 | 40 |
| Jala (ml) | 320 | 160 | 150 | 40 |
| Final end product(ml) | 75 | 40 | 140 | 30 |

**Table 7: Organoleptic tests of four different Arjuna Ksheerpakas.**

| Sr. No | Tests | Sha.sa (AKSS) | Ashtang Sangraha (AKAS) | Dravyaguna vidnyana (AKYT) | Chakradatta (AKCD) |
|---|---|---|---|---|---|
| 1 | Odour | Dugdha Gandhi | Dugdha Gandhi | Dugdha Gandhi | Dugdha Gandhi |
| 2 | Colour | Pinkish red+ | Dark brown | Pinkish red++ | Faint Brown |
| 3 | Taste | More Sweet, Astringent + | Less Sweet, Astringent ++++ | Sweet, Astringent ++ | Sweet, Astringent +++ |
| 4 | Texture | Soft ++++ (snigdha), Sheeta | Soft + (snigdha), Sheeta | Soft +++ (snigdha), Sheeta | Soft ++ (snigdha), Sheeta |

**Table 8: Physiochemical tests of four different Arjuna ksheerpakas.**

| Sr no | Testing parameter | Result | | | | | |
|---|---|---|---|---|---|---|---|
| | | Milk | Decoction | Sha.sa (AKSS) | Ashtang Sangraha (AKAS) | Dravyagun vidnyana (AKYT) | Chakra-datta (AKCD) |
| 1 | pH | 6.36 | 4.96 | 5.92 | 5.27 | 5.94 | 5.34 |
| 2 | Specific Gravity | 1.0312 | 1.0224 | 1.0198 | 1.0528 | 1.0333 | 1.0236 |
| 3 | Moisture % | 65.75 | 95.19 | 94.06 | 86.75 | 76.87 | 93.58 |
| 4 | Viscosity cp | 5.02 | 5.48 | 1.37 | 4.38 | 1.76 | 4.16 |
| 5 | Water soluble extract | - | 04.81 | - | - | - | - |

**Table 9: Macro-nutritional values of four different Arjuna ksheerpakas.**

| Sr no | Testing parameter | Results | | | | | |
|---|---|---|---|---|---|---|---|
| | | Milk | Decoction | Sha.sa (AKSS) | Ashtang Sangraha (AKAS) | Dravyagun vidnyana (AKYT) | Chakra-datta (AKCD) |
| 1 | Total solid contents % | 34.25 | 04.81 | 05.94 | 13.25 | 23.13 | 6.42 |
| 2 | Proteins % | 11.37 | - | 2.56 | 1.41 | 8.21 | 0.17 |
| 3 | Fat % | 8.08 | - | 0.50 | 1.2 | 4.27 | 0.0 |
| 4 | Carbohydrates % | 14.00 | - | 2.60 | 10.03 | 9.93 | 5.9 |
| 5 | Calories –Kcal | 174 | - | 25 | 56 | 110 | 24 |

**Table 10: Micro nutritional values of four different Arjuna ksheerpakas.**

| Sr no. | Testing parameter | Results | | | | | |
|---|---|---|---|---|---|---|---|
| | | Milk | Decoction | Sha.sa (AKSS) | Ashtang Sangraha (AKAS) | Dravyag un vidnyana (AKYT) | Chakra-datta (AKCD) |
| 1 | Total Minerals % | 0.80 | 0.16 | 0.28 | 0.61 | 0.72 | 0.35 |
| 2 | Calcium mg/100gm | 135 | 180 | 122 | 145 | 138 | 156 |
| 3 | Magnesium mg / 100gm | 14 | 22 | 18 | 18 | 16 | 20 |

**Table no 11: HPTLC analysis of four different Arjuna ksheerpakas, kwath and bark powder.**

| Samples | AKSS | AKAS | AKYT | AKCD | Kwath |
|---|---|---|---|---|---|
| Arjunic acid Conc (µg/ml of ethyl acetate extract) | 58.062 | 66.420 | 35.789 | 212.596 | 33.828 |
| Arjunic acid (µg/ml of milk extract) | 19.354 | 22.14 | 11.929 | 70.865 | 11.276 |
| Arjunic acid (µg/gm of bark) | 154.83 | 88.56 | 178.93 | 283.46 | 45.104 |

**Table no 12: Concentration of Arjunic acid in Ethyle Acetate and Meyhanol extract of Arjun Bark powder.**

| Sample | Result |
|---|---|
| Arjunic acid Conc (µg/ml of ethyl acetate extract) of Arjun Bark | 178.93 µg/gm |
| Arjunic acid (µg/ml of methanol extract) of Arjun Bark | 201.7 µg/gm |

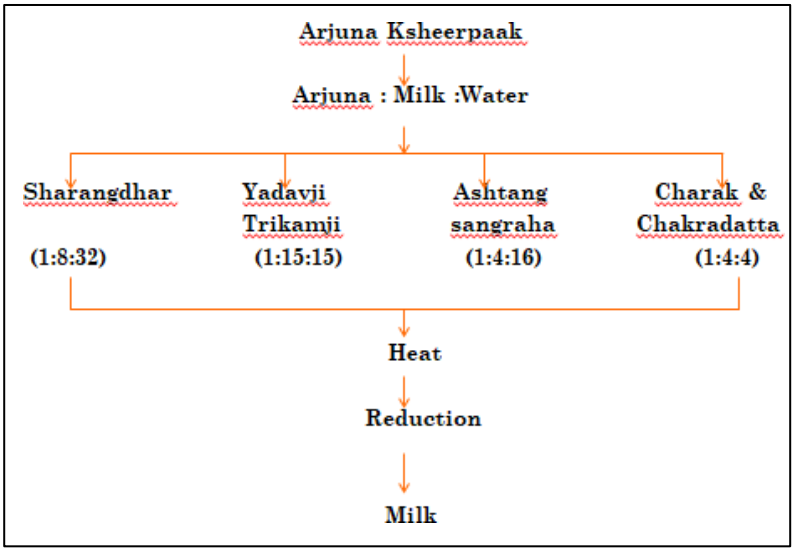


**Fig. 1: General Method of preparation of Ksheerpaak.**

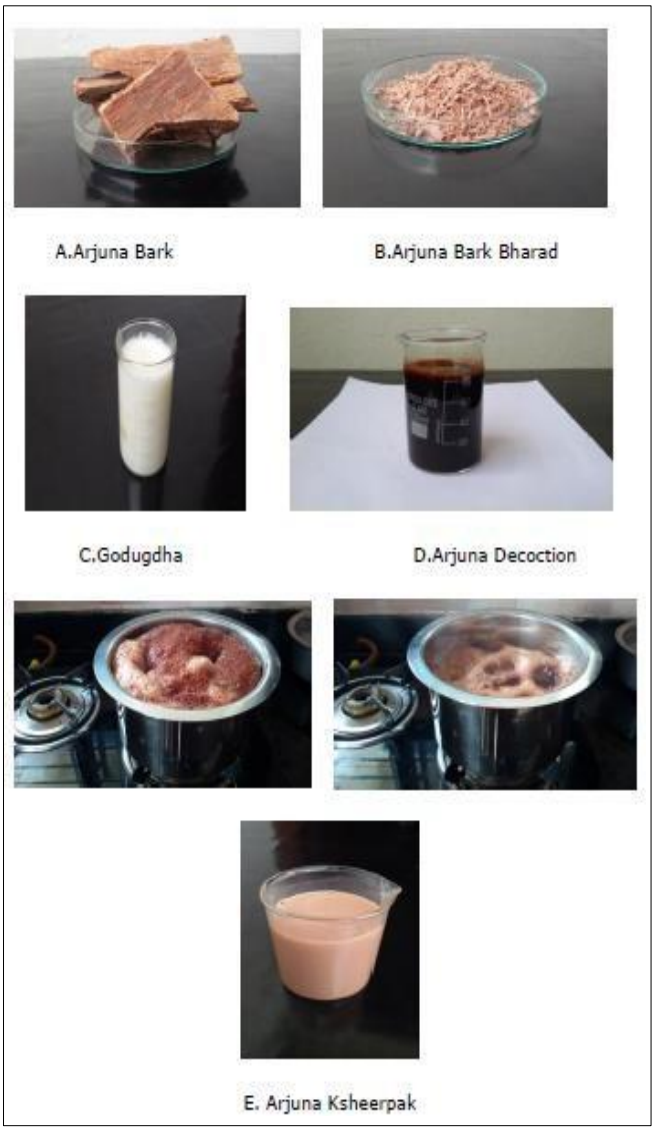


**Fig. 2: Raw material, In process method & final product.**

**Arjuna Ksheerpak as per AKSS**


**Arjuna Kwath**

**Arjuna Ksheerpak as per AKAS**

**Arjuna Ksheerpak as per AKYT**

**Arjuna Ksheerpak as per AKCD**

**Fig. 3: Arjunic acid in ethyl acetate extract.**

**Fig. 4: Arjunic acid in Methanol extract.**

## DISCUSSION

1. In present study, Arjun Ksheerpak is prepared by four different methods ie According to Sharangdhar Samhita, Ashtang Sangraha, Dravyaguna mentioned by Acharya Yadavji Trikumji and Chakradatta with Arjun powder: milk: water proportion are 1:8:32,1:4:16,1:15:15 and 1:4:4 respectively.

2. Considering time duration for preparation of Arjun Ksheerpak, Maximum time taken for preparation of Arjun Ksheerpak is by the method prepared by Sharangdhar Samhita (AKSS) and minimum tame taken for preparation for Arjuna ksheerpak is by the method prepared by Chakradatta (AKCD).
3. Considering obtained final end product, Maximum quantity of Arjun ksheerpak obtained by according to Dravyaguna method mentioned by Acharya Yadavji Trikumji (AKYT) and less quantity is obtained by method according to Chakradatta.
4. The concentration of Arjunic acid of Arjun ksheerpak in ethyl acetate extract of Arjun ksheerpak prepared by Chakradatta (AKCD) is more than rest of three Arjun ksheerpakas.
5. On the basis of macronutrients present in Arjun ksheerpak, the method mentioned in Dravyaguna by Acharya Yadavji Trikumji is better and on the basis of micronutrients present in Arjun ksheerpak, the method mentioned in Chakradatta is better.
6. The concentration of Arjunic acid of Arjun bark powder in methanol extract prepared by Soxhlet method is more than ethyl acetate extract.

## CONCLUSION

1) Arjun ksheerpak prepared by Yadavji Trikumji (AKYT) is better than other methods of Arjun ksheerpakas on the basis of obtaining high yield (final end product) and presence of Macro-Nutritional values.
2) Arjun ksheerpak prepared by Chakradtta is better (AKCD) on the basis of consumption of total time for preparation of Arjun ksheerpak, presence of arjunic acid by HPTLC study and presence of micro nutrients. The methanol extract values of Arjun bark powder indicates the better extraction in alcohol base.

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