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STANDARDIZATION AND COMPARATIVE PHARMACEUTICAL STUDY OF SHUNTHI KSHEERPAKA POWDER PREPARED FROM TWO DIFFERENT TYPES OF MILK MEDIA W.S.R. TO ITS SPRAY DRYING METHOD

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ABSTRACT
Ayurveda is the ancient science of life in which pharmaceutical preparations are the basic and mandatory part. In Bhaishajya Kalpana Vigyana, *Panchavidha Kashaya Kalpanas* are the basic K*alpanas* for all other *Upkalpanas.*[1] *Ksheerpaka Kalpana* is one of the important and differerent dosage form and also *Upkalpana* of *Kvath Kalpana*. This unique preparation mentioned in well-known ayurvedic classics like Charak samhita, Sushrut Samhita,Astang Sangarah, Astang Hridayam, Kasyapa Samhita, vrindmadhav, Chakradutta, Vangasena, Bhavprakash, Yogaratnakara, BhaishajyaRatnavali, Gadanigraha, Brihat Nighantu Ratnakara and Sharandhara Samhita. *Ksheerpaka Kalpana* is a formulation in which *Ksheera* is the main media of administration.It has a property of water soluble, lipid soluble and protein soluble constituents.For making milk digestable and *Laghupaki Shunthi Ksheerpaka* is commonly used by practitioners.[2] It is also used in *Amavata,Ajirna,Udaavarta,Chardi, Hikka, Aadhmana,Shula* and *Kasa.*[3] we usually used *Godugdha* for making *Ksheerpaka*. While in *Chakradutta Samhita Aacharya Chakradutta*[5] mentioned *Shunthi Siddha Aja Ksheer* (Goat milk) for treatment of *Hikka*.So here is an attempt to make a *Shunthi Ksheerpaka* based on Aacharya Sharangadhara's *Ksheerpaka* proportion (1:8:32) by using two different milk media (*Godugdha & Ajadugdha*). *Ksheerpaka* is very difficult to prepare outdoor and due to very low shelf life (*Sadyosevana*) it's impossible to carry.So we will convert *Shunthi Ksheerpaka* in a powder form through spray dried method and evaluate efficacy and compare both types of spray dried powder.Thus we will give an insight for such instant preparation in to stable modified dosage form.

KEYWORDS: *Ksheerpaka*, Spray drying, *Shunthi, Go-dugdha, Aja-dugdha*.

INTRODUCTION
The *Ksheerpaka Kalpana* is made up from sum of two words *Ksheerapaka* and *Kalpana*.[4] In Nomenclature of *Ksheerpaka* the first word begins with *Ksheera* is due to presence of large quantity of milk in formulations and also having many magicial properties of milk. Milk is easily assimilated in human body, prevent various diseases, works as immunomodulator. The solubility of fat and proteins in the media increases the extraction of medicinally important active constituents and retains in the media. milk works as food, good source of vitamins, minerals and other nutrients, also an emulsion from having capability to dissolve water, fat and protein soluble ingredients of the drug. milk is palatable, good antacid and rich in dietic value thus it can be taken by all age group especially old age people and children. For making *Ksheerpaka*, there are different ratio and method found in classical text. The common method is one part of drug is boiled with eight parts of milk and thirty-two parts of water. boiling should be continued on low flame till original quantity of milk remains and water portion gets evaporated (1:8:32). *Ksheerapaka* has to be prepared on *mandaagni* so active principle should remain and may not get impaired with high temperature. General dose of *Ksheerpaka is 2 Pala. Shunthi Ksheerpaka reference is found in* Charaka Samhita Sutrasthana[5] and Chikitsasthana, Sushruta Sutrasthana,[6] Chakradutta Samhita,[7] Astanga Hridaya,[8] Astanga Sangaraha[9] and Sharandhara Samhita[10] by using different milk media *Go-dugdha* and *Aja-dugdha*.The Aim of *Ksheerpaka Kalpana* is to extraction of medicinal values from decoction of milk with the help of *agni*. *Ksheerpaka* is useful as a medicament as well as nutrient. thus, *Ksheerpaka* preparations mainly used in *Rasayana* and *Bruhana* purposes. Also, it can be considered as a medicinal food or Nutraceuticals, which provides health as well as medical benefits including the treatment and prevention of disease. Milk is extremely perishable and yet, for a number of reasons, it has to be preserved for later consumption. The removal of water prevents the

growth of micro-organisms and facilitates preservation and storage of milk constituents. Spray drying is one of the most convenient techniques for producing milk powders and for stabilising milk constituents.[11]

AIMS AND OBJECTIVES

1. To compare *Shunthi Ksheerapaka* powder prepared from 2 milk bases.
2. To develop S.M.P of *Shunthi Ksheerpaka* powder prepared from 2 milk bases-*Godugdha* and *Ajadugdha* with spray drying method.

MATERIALS AND METHODS

Detail review have been done on *Ksheerpaka Kalpana* and its spray drying method. Relevant information from original classical texts, reference books, journals, website and web sources are studied. To understand the basic concepts, Study of different classical and modern texts, reputed publish articles, catalogs, and other web sources study have been done.

Method of preparation

In the Present Study, three batches of *Shunthi Ksheerpaka* spray dried powder of *Go-dugdha* & *Aja-dugdha* were prepared to develop S.M.P. The study is divided into two phases:

1. *Shunthi Ksheerpaka* preparation.
2. Conversion of both *Ksheerpaka* into spray dried powder form.

Procedure –

- Took all the ingredients of *Ksheerpaka*. (*Shunthi Churna, Dugdha, Jala)*
- Mixed all the ingredients in stainless steel vessel in the proportion of 1part *Shunthi* (125 gm) *churna*, 8 parts of *Dugdha* (1 litre) and 32 parts (4 litre) of *Jala*. (1:8:32 drug: milk: water)
- Scale measurement of *Shunthi* and *Go-dugdha* mixture was 2.5 cm and then water was added.
- Kept vessel on a Gas-stove.
- Measure temperature after every 20 minutes.
- Boiled until only the milk portion remains behind up to 2.5 cm and the constituents of the *Shunthi Churna* were extracted into it.
- Filtered the mixture with cotton cloth.

(Repeated this procedure for two times using two different milk media-*Go-dugdha & Aja-dugdha*)

Precautions –

- The dry drug *Shunthi* is mixed after making it into coarse powder form.
- The boiling is continued till the added water portion gets evaporated and the original quantity of milk is left.
- *Ksheerpaka* has to be prepared on low flame (*mandagni)* so that active principle may not get spoiled with high temperature.
- Stirring should be done Frequently.

1. *Shunthi ksheerpaka* preparation

Table 1.1: Showing results of *Shunthi Ksheerpaka* prepared from *Go-dugdha* of all batches.

Sr. No.	Parameters	$SKPG_1$	$SKPG_2$	$SKPG_3$	Avg.
1	Initial weight of *Shunthi* (gm)	125	125	125	125
2	Volume of D/water (litres)	4	4	4	4
3	Volume of Cow Milk (litre)	1	1	1	1
4	Reduction Part	¼	¼	¼	¼
5	Obtained *Shunthi Ksheerpaka* Final Yield (out of 1000 ml/1 litre)	995	1000	996	997
6	Average Temperature during process (^{0}C)	96.64	96.12	95.7	96.15
7	Total Duration of Process (hrs)	4:50	4:45	4:40	4:45

Table 1.2.: Showing results of *Shunthi Ksheerpaka* Prepared from *Aja-dugdha* of all batches.

Sr. No.	Parameters	$SKPA_1$	$SKPA_2$	$SKPA_3$	Avg.
1	Initial weight of *Shunthi* (gm)	125	125	125	125
2	Volume of D/water (litres)	4	4	4	4
3	Volume of Goat Milk (litre)	1	1	1	1
4	Reduction Part	¼	¼	¼	¼
5	Obtained *Shunthi Ksheerpaka* Final Yield (out of 1000 ml/1 litre)	990	995	996	993.6
6	Average Temperature during process (^{0}C)	96.11	84.7	94.9	91.9
7	Total Duration of Process (hrs)	4:35	4:35	4:30	4:33

Table 1.3: Showing Average results of *Shunthi Ksheerpaka* prepared from *Go-dugdha* and *Aja-dugdha* of all batches.

Sr. No.	Parameters	Avg. (SKPG1 + SKPG2 + SKPG3)	Avg. (SKPA1 + SKPA2 + SKPA3)
1	Initial weight of *Shunthi* (gm)	125	125
2	Volume of D/water (litres)	4	4

3	Volume of Cow Milk (litre)	1	1
4	Reduction Part	¼	¼
5	Obtained *Shunthi Ksheerpaka* (ml)	997	993.6
6	Average Temperature during process (^{0}C)	96.15	91.9
7	Total Duration of Process (hrs)	4:45	4:33
8	Final Yield (ml)	997 ml	993.6ml

(*SKPG=*Shunthi Ksheerpaka* prepared from *Go-dugdha*, *SKPA=*Shunthi ksheerpaka* prepared from *Aja-dugdha*)

2. Conversion of both *Ksheerpaka* into spray dried powder form.

Both types of *Shunthi Ksheerpaka* (SKPG and SKPA) is coverted into the dried powder by using Touch Screen Lab spray dryer model SPD-P-111 at Gujarat Technological University,Gandhinagar. *Ksheerpaka* was kept in spray drying unit with standard setting of atomizer on temperature-controlled mode. (Inlet Temperature (C^0)-195 and Outlet Temperature (C^0)-47.8.)

- Spray Drying involves atomization or spray nozzle to disperse the liquid Feedstock-(*Shunthi Ksheerpaka*) into a controlled drop size spray. The most common of these are rotary disk and single fluid high pressure swirl nozzles.
- Contacting the *Ksheerpaka* droplets with hot air in a drying chamber.
- Evaporation of Moisture from the droplets.
- Formation of dry particles proceed undercontrolled following temperature and airflow conditions and dried powder of *Shunthi Ksheerpaka* takes place.

Precautions –

- Product quality and properties can be effectively controlled and maintained through the entire drying process.
- Nozzle should not be blocked. Frequently check the blockage of nozzle. (It is usually used to make the droplets as small as possible.droplet sizes can range from 20 to 180 micron.)
- Control the Airflow, Temperature and pump speed.
- Make sure that the area around the machine is clean and free of dust and powder.

Table 4.12: Showing result of pilot study of *Shunthi Ksheerpaka* spray dried powder of *Go-dugdha & Aja-dugdha.*

RESULT-

Sr. No.	Perticulars	Result Obtained							
		Go-dugdha				*Aja-dugdha*			
		SDP1	SDP2	SDP3	AVG.	SDP1	SDP2	SDP3	AVG.
1	Volume of *Shunthi Ksheerpaka* (ml)	995	1000	996	997	990	995	996	993.6
2	Weight of Obtained Spray Dried Powder (gm)	67.20	70	62.5	86.56	72	73.0	74.4	93.13
3	Obtained powder in %	6.7	7.0	6.27	8.56	7.27	7.33	7.46	9.35
4	Duration Taken (hours)	4.0	3.50	4.10	3.86	3.35	4.00	3.40	3.58

DISCUSSION

In *Shunthi Ksheerpaka Kalpana*,it is necessary to know the role of *dugdha* along with *Shunthi Churna*. Properties of milk and medicinal plant extracts come together and work to prevent diseases *Dugdha* also provide nourishment and immunological protection and has nutritive value as food.milk is such carrier that has been effectively used to deliver phytochemicals for targeted health benefits.Interaction among the bio molecules of milk and bioactive compounds in herbs is occurred during the preparation of *Kssheerpaka Kalpana* due to heat.But *Ksheerpaka* is very difficult to prepare outdoor and due to very low shelf life (*Sadyosevana*) it's impossible to carry. Spray drying is one among the method of producing dry powder from a liquid *Ksheerpaka* material by quickly drying with the help of the hot gas. It is the actual ideal method for different thermal-sensitive materials like food and Pharmaceutics. The Percentages of yield powder obtained by *Shunthi Ksheerpaka* prepared from *Go-dugdha* & *Aja-dugdha* are 8.656 % and 9.35% respectively. Average values are higher in *Shunthi Ksheerpaka* spray dried powder *Go-dugdha* than in *Aja-dugdha*.

Plate No. 1.1- *Shunthi Ksheerpaka* Preparation from *Go-dugdha* & *Aja-dugdha*.
Fig. 1.1.1 – Ingredients of *Shunthi Ksheerpaka* from *Aja-dugdha*
Fig. 1.1.2 – Ingredients of *Shunthi Ksheerpaka* from *Go-dugdha*
Fig. 1.1.3 –Individually Mixing of milk and *Shunthi Churna* in both preparation
Fig. 1.1.4.- Scale measurement in both the preparation
Fig. 1.1.5.-Addition of water in both preparation
Fig. 1.1.6.- Boiling on *Mandagni* till all the water portion get evaporates
Fig. 1.1.7.- Temperature measurement of both the mixture after every 20 min.
Fig. 1.1.8.-Prepared *Shunthi Ksheerpaka* from *Go-dugdha* and *Aja-dugdha*.
Fig. 1.1.9.- Temperature measurement of *Shunthi Ksheerpaka*.

Plate No. 1.2 – *Shunthi Ksheerpaka* Spray drying
Fig. 1.2.1 – Spray Drying machine

Fig. 1.2.2 – Observation of process data
Fig. 1.2.3 – *Shunthi Ksheerpaka* Spray dried powder

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CONCLUSION
Among all other *Kalpanas*, *Ksheerpaka Kalpana* is widely used to treat chronic diseases. *Shunthi Ksheerpaka* is mostly useful for aged people and childrens and its spray dried powder is more beneficial as they can easily take such a new dosage form. Spray drying of *Ksheerpaka* makes removal of water and prevents the growth of micro-organisms and facilitates preservation and storage of milk constituents and it is one of the most convenient techniques for producing milk powders from *Ksheerpaka*. *Shunthi Ksheerpaka* spray dried powder from *Go-dugdha* shows more yield as comparison to *Aja-dugdha*.

This Comparative study is an exploratory and to fixed S.M.P. including some quality Standards and developed economic instant *Shunthi Ksheerpaka* by Spray drying technique.

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