

**PHARMACOGNOSTICAL AND PHYSICO-CHEMICAL ANALYSIS OF
SHATAVARYADI KSHEERAPAKA -A POLYHERBAL MILK-BASED
FORMULATION FOR THE MANAGEMENT OF MENOPAUSAL
SYNDROME**

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ABSTRACT

Background: *Rasayana* (rejuvenating) therapy is the treatment of choice in Ayurveda for management of menopausal syndrome. Various combinations of *Rasayana* drugs are being used for this purpose. But there is a need for proper standardization of these formulations. *Shatavaryadi Ksheerapaka* is such a formulation widely used by the Ayurvedic practitioners for treating the menopausal syndrome. **Materials and Methods:** The process of standardization included identification and authentication of raw drugs, standardizing the method of preparation of *Ksheerapaka* (milk based formulation), pharmacognostical, physico-chemical analysis of the drug in powder form, and HPTLC analysis as per the standard protocols. **Results:** The

pharmacognostical evaluation revealed acicular crystals, scalariform vessels, and starch grains of *Shatavari*, cluster crystal, cork cells, stone cells, lignified fibres, Rosette crystals etc. of *Arjuna*, compound Starch grains, pitted vessels, pollen grains, rhomboidal crystals, stellate trichome etc. of *Atibala*. Pharmaceutical analysis showed loss on drying 7.10% w/w, ash value 9.23% w/w, water soluble extract 0.132g w/w, alcohol soluble extract 0.272 g w/w

and pH value as 6.425. HPTLC revealed 5 peaks in 254nm and 2 peaks in 366 nm.

Discussion and Conclusion: The pharmacognostical and physico-chemical analysis of the formulation meet the minimum qualitative standards as per the API at the preliminary level. So, the results can be considered as a guideline for further studies.

KEYWORD: *Shatavaryadi Ksheerapaka*, Pharmacognosy, Pharmaceutical analysis, Menopausal syndrome, *Rajonivrutti*.

INTRODUCTION

Shatavaryadi Ksheerapaka is a unique combination of three *Rasayana*(rejuvenating) drugs called *Shatavari*(*Asparagus recemosus*), *Atibala*(*Abutilon indicum*) and *Arjuna*(*Terminalia arjuna*) processed in cow's milk. It is a "Anubhuta yoga" (formulation established by frequent use by the renowned practitioners) especially used for treating debilitating conditions.

The three ingredients of this formulation are well known for their anabolic, antioxidant and immunomodulatory actions. *Shatavari* is a widely accepted female rejuvenating drug with *Rasayana* property. Studies have proven that it contains steroidal saponins and isoflavones as chemical constituents that fall under the group of phytoestrogens. Studies have also reported its role in managing symptoms related to menopause like postmenopausal osteoporosis.^[1] *Atibala* contains several chemical constituents such as phenolics, terpenoids, flavonoids, pigments and other natural oxidants including Vitamin A, Vitamin C and Vitamin E. So, it was proven to be useful in prevention as well as treatment of chronic conditions like heart diseases, cancer, diabetes, hypertension etc.^[2] *Arjuna* is also having a widespread medicinal potential in many diseases particularly cardiovascular disorders.^[3]

As per Ayurvedic classics, *Atibala* is *Balya*(strength promoting), *Rasayana*(rejuvenating), *Vrishya*(aphrodisiac), and *Snigdha*(unctuous).^[4] *Arjuna* is *Hridya*(cardio-protective), *Shonitasthapaka* (hemato-protective), and *Sandhaniya*(helpful in maintaining the structural integrity of the tissues).^[5] Cow's milk is *Rasayana*(rejuvenating), *Jeevaniya*(vitalizing), *Medhya* (brain tonic), and *Balya* (strength promoting).^[6]

In Ayurveda, menopause is considered as a feature of *Jaravastha*(old age) in women. It leads to gradual depletion of body elements and ultimately leads to *Ojakshaya*(decrease of vitality). The *Ahara Rasa* (nutrient fluid) fails to nourish the *Dhatu*(tissues). It is included under the

category of *Swabhavika Vyadhi*(natural ailment). So, it can't be arrested. So, *Sadharana Chikitsa* (prophylactic care) for improving the general health and quality of life is the treatment of choice here.

Standardization of polyherbal formulations is essential for validating their efficacy and establishing the quality standards of the products. The process of standardization begins right from the proper identification of raw materials in terms of their morphological characters and microscopic evaluation. The proper method of preparation and analytical studies for the prepared formulation are also essential for this purpose. In this study, an attempt has been made to evaluate the pharmacognostical, physicochemical evaluation and High Performance Thin Layer Chromatography (HPTLC) study of the *Shatavaryadi Choorna*(the powder form of drugs) used to prepare the milk based formulation.

MATERIALS AND METHODS

Procurement of raw materials

The raw drugs *Shatavari*, *Atibala* and *Arjuna* were procured from the pharmacy of Institute of Teaching and Research in Ayurveda (ITRA), Jamnagar.

Identification and Authentication

The procured raw drugs were identified, authenticated and microscopically evaluated in the Pharmacognosy Laboratory, ITRA, Jamnagar, and cross verified with the Ayurvedic Pharmacopeia of India (API).^[7]

Preparation of Drug

Preparation of the drug *Shatavaryadi Choorna* (containing equal amount of *Shatavari*, *Atibala* and *Arjuna*) in fine powder form was carried out in the pharmacy of ITRA, Jamnagar, Gujarat.

Method of preparation and dosage of *Shatavaryadi ksheerapaka*

Ksheerapaka is advised to be prepared by following the classical guidelines.^[8] The ingredients of *Shatavaryadi Ksheerapaka* are mentioned in Table 1.

Table 1(original): Ingredients of *Shatavaryadi Ksheerapaka*.

Raw Drugs			
Name of Drug	Latin Name	Part used	Quantity
<i>Shatavari</i>	<i>Asparagus recemosus</i>	Root	5g
<i>Arjuna</i>	<i>Terminalia arjuna</i>	Stem bark	5g
<i>Atibala</i>	<i>Abutilon indicum</i>	Whole plant	5g
<i>Ksheerapaka Dravya</i>			
Cow's Milk			120ml
Portable Water			480 ml

15g (1 part) of *Shatavaryadi Choorna* (fine powder) is added and boiled with 120 ml (8 parts) of cow's milk and 480 ml (32 parts) of potable water and reduced until only milk part remains (120ml). Freshly prepared *Shatavaryadi Ksheerapaka*(120ml) is advised for the patients to be taken in morning and evening after food.

Pharmacognostical evaluation

Apart from the morphological identification, organoleptic features like colour, odour, taste and texture were recorded and powder microscopy of the drug *Shatavaryadi Choorna* was also carried out as part of pharmacognostical evaluation. Fine particles of *Shatavari Choorna*, were studied with stain and without stain under the Carl Zeiss trinocular microscope attached with camera. Micro photographs of the slides were taken and documented.^[9]

Physicochemical analysis of *Shatavaryadi Choorna*

The physicochemical analysis of the finished drug (*Shatavaryadi choorna*) was carried out in the pharmaceutical chemistry laboratory of ITRA, Jamnagar.^[10]

HPTLC^[11]

Instrumentation: A CAMAG HPTLC system (Muttensz, Switzerland) equipped with a sample applicator TLC auto sampler 4, twin trough plate development chamber, TLC Scanner 3, win CATS software version 1.4.4. and Hamilton (Reno, Nevada, USA) Syringe.

HPTLC method: 5µl of extract was loaded on E. Merck aluminium plate pre coated with silica gel 60 F254 of 0.2 mm thickness and the plate was developed in Toluene: Ethyl acetate (9:1) in twin trough chamber previously saturated with solvent system. After development densitometric scan was performed with a Camag TLC scanner III in reflectance absorbance mode at 254 and 366 nm under control of Win CATS Software (V 1.2.1. Camag) (Stahl, 1969). The plate was then dipped in sulphuric acid reagent and heated in a hot air oven at

105°C until the colour of the spots appeared and profile photo was documented under white light.

RESULTS

Pharmacognostical Study

Organoleptic Characters: The organoleptic characters of *Shatavaryadi Ksheerapaka* are shown in Table 2.

Microscopic Characters: The powder microscopy of *Shatavaryadi Choorna* revealed the characteristic features of all the three ingredient drugs (*Shatavari*, *Atibala* and *Arjun*) which are shown in the Table 3 and Figure 1.

Physico-chemical analysis

Physico-chemical parameters of fine powder like loss on drying, ash value, water soluble extract, methanol soluble extract and pH were all found to be within the normal range as per API guidelines. Details are tabulated in Table 4.

HPTLC

Chromatographic study (HPTLC) was carried out under 254 and 366 nm UV. The number of peaks and R_f values are mentioned in Table 5. The peak distribution is shown in figure 2.

Table 2(original): Organoleptic Characters of *Shatavaryadi Choorna*.

Sl.No:	Parameters	<i>Shatavaryadi Choorna</i>
1	Colour	Light chocolate brown
2	Odour	Slightly fragrant
3	Taste	Astringent, bitter
4	Touch	fine
5	Texture	smooth

Table 3(original): Characteristic features of the ingredient drugs of *Shatavaryadi Choorna*.

1.	Acicular crystals of <i>Shatavari</i>
2.	Scalariform vessels of <i>Shatavari</i>
3.	Starch grains of <i>Shatavari</i>
4.	Brown cantant of <i>Arjuna</i>
5.	Cluster crystal of <i>Arjuna</i>
6.	Cork cells of <i>Arjuna</i>
7.	Fibres of <i>Arjuna</i>
8.	Lignified fibres of <i>Arjuna</i>
9.	Rosette crystals of <i>Arjuna</i>


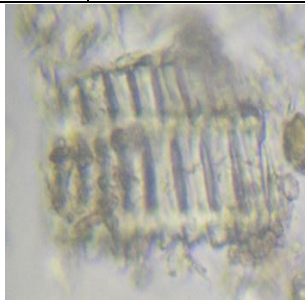
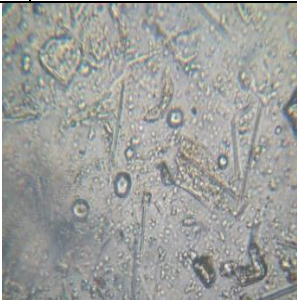
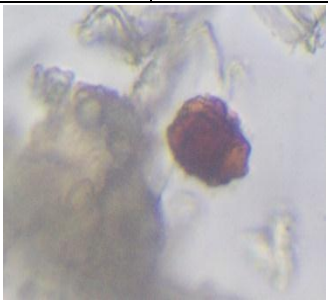




10.	Starch grains of <i>Arjuna</i>
11.	Stone cell of <i>Arjuna</i>
12.	Compound Starch grains of <i>Atibala</i>
13.	Fibres of <i>Atibala</i>
14.	Lignified fibres of <i>Atibala</i>
15.	Pitted vessels of <i>Atibala</i>
16.	Pollen grains of <i>Atibala</i>
17.	Rhomboidal crystals of <i>Atibala</i>
18.	Rosette crystal of <i>Atibala</i>
19.	Starch grain of <i>Atibala</i>
20.	Stellate trichome of <i>Atibala</i>

Table 4: Physic-chemical analysis of *Shatavaryadi Choorna*.

Parameters	Value
Loss on drying	7.10% w/w
Ash Value	9.23 % w/w
Water soluble extract	0.132g w/w
Alcohol soluble extract	0.272g w/w
pH	6.425

Table 5: HPTLC profile of *Shatavaryadi Choorna*.

Conditions	Number of peaks	Rf Values
Short ultra violet (254nm)	5	0.04,0.36,0.46,0.53, 0.86
Long Ultra violet (366 nm)	2	0.04, 0.06

			
Acicular crystals of <i>Shatavari</i>	Scalariform vessels of <i>Shatavari</i>	Starch grains of <i>Shatavari</i>	Brown cantant of <i>Arjuna</i>
			
Cluster crystal of <i>Arjuna</i>	Cork cells of <i>Arjuna</i>	Fibres of <i>Arjuna</i>	Lignified fibres of <i>Arjuna</i>

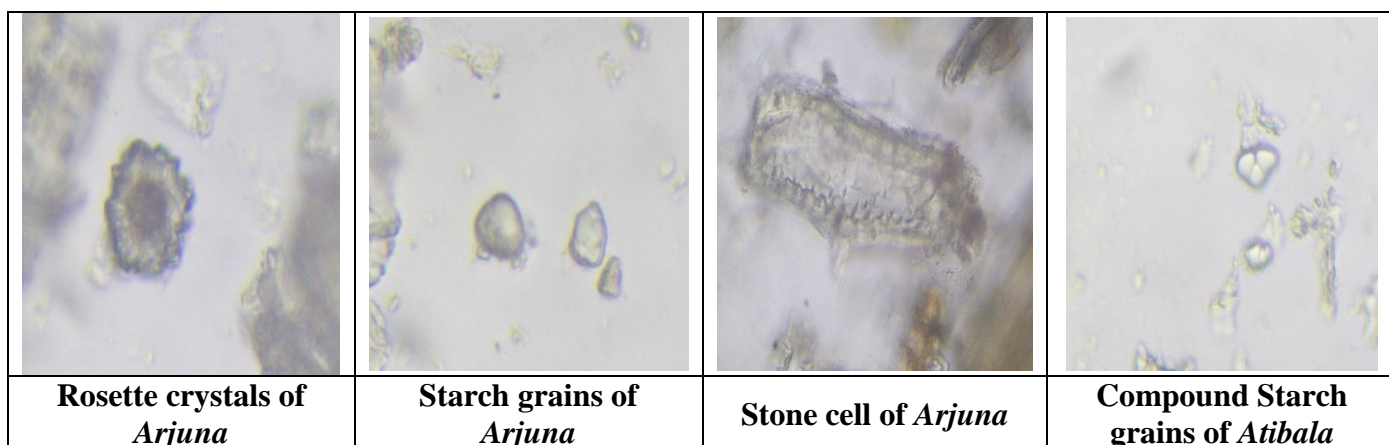


Figure 1: The micro photographs of the ingredient drugs of *Shatavaryadi Choorna*.

Peak Distribution

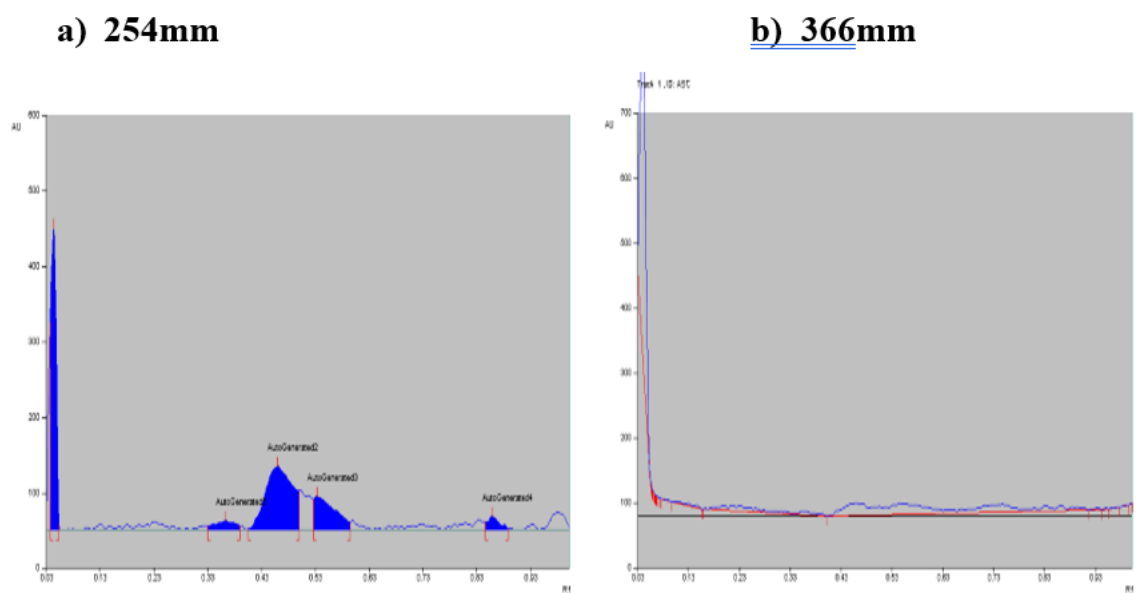


Figure 2: HPTLC Plate.

DISCUSSION

The basic step for standardization of a new formulation is to strictly follow the pharmacognostical and physico-chemical parameters. *Shatavaryadi Choorna* which is a mixture of three ingredient drugs under pharmacognostical evaluation showed the particular microscopical characters of all the ingredient drugs which prove the purity and quality of the drug. The results obtained from the primary physicochemical analysis also were within the API norms which indicate good quality of the product. The analysis of formulation in its *Ksheerapaka* form (processed with milk) has not been carried out in this study. But a previous study of its *Ksheerapaka* form showed certain alterations or modifications in the microscopic characters due to the processing(boiling) and suggested that these changes may

bring about positive effect in the form of easy disintegration, easy absorption and assimilation of the drug into to the body system.^[12] But in this study, the aim was to qualify the raw materials and prepared drug in the powder form to be given to patients for preparing *Ksheerapaka*(milk based preparation).

CONCLUSION

Shatavaryadi Ksheerapaka which is a unique combination of three *Rasayana*(rejuvenating) drugs has already shown promising results in clinical management of menopausal syndrome. On pharmacognostical and physico-chemical analysis, the formulation meets the minimum qualitative standards as per the API at the preliminary level. So, these parameters of pharmacognosy and pharmaceutical analysis can be used as a guideline for further studies.

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