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Original Research Article

Pharmacognostical and pharmaceutical analysis of *Triphala Kajjali* tablet-an ayurvedic herbomineral formulation for metabolic syndrome

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ABSTRACT

Background: *Triphala* is one of the most easily available and commonly used medicine which contains fine powder of three fruits viz. *Terminalia chebula* Retz. *(Haritaki)*, *Terminalia bellerica* Roxb. *(Bibhitaki)* and *Embilica officinalis* Gaertn. *(Amalaki)* and is indicated as one of the drugs for management of disorders of *Kapha and Meda.* Due to bitter and astringent taste of Triphala in the powder form is a major complaint of the patients. So, to discover that form of *Triphala*, which is easy to take, effective in low dose, has long shelf life and simple to dispense is the need. For assurance of quality of herbal compounds pharmacognostical and pharmaceutical analysis should be done.
Methods: *Triphala Kajjali* was subjected to microscopic evaluation for pharmacognostical, physiochemical analysis like hardness, weight variation, loss on drying, ash value, acid insoluble extract, pH value, water soluble extract, alcohol soluble extract and high-performance thin layer chromatography (HPTLC).
Results: Pharmacognostical study showed the presence of certain identifying characters of all of the ingredients of *Triphala Kajjali* that is *Haritaki*, *Bibhitaki* and *Amalaki*. In pharmaceutical study, preliminary physiochemical analysis showed that hardness of the tablet was 2.05 kg/cm^2, ash value 4.03%w/w, loss on drying 5.5%w/w, water soluble extract 5.89%w/w, alcohol soluble extract 25.96%w/w and HPTLC showed 7 spots in 254 nm and 7 spots in 366 nm.
Conclusions: Pharmacognostical and physico-chemical observations revealed the specific characters of all active constituents of *Triphala Kajjali* and confirmed the purity and genuinity of the drug.

Keywords: *Triphala kajjali*, Metabolic syndrome, Pharmacognosy, Pharmaceutical analysis

INTRODUCTION

Triphala is one of the most easily available and commonly used medicine which contains fine powder of three fruits viz. *Terminalia chebula* Retz. *(Haritaki)*, *Terminalia bellerica* Roxb. *(Bibhitaki)* and *Embilica officinalis* Gaertn. *(Amalaki)* and is indicated as one of the drugs for management of disorders of *Kapha* and *Meda* (Fatty tissues). Pharmacological studies on *Triphala* indicate that it possesses properties like anti-oxidant, anti-hypercholesterolemia, anti-diabetic, anti-obesity, anti-inflammatory, immunomodulatory and cardio protective, and thus can play major role in the management of metabolic syndrome.

Though various dosage form of medicine is mentioned in the classic depending upon the drugs used in the preparation of formulation, but in present era, people prefer medicine that are palatable, have small dose, cost effective and that give immediate effect. Moreover, as per *Charaka Samhita*, that medicine is considered as appropriate which is effective in low dose *(Alpamatra)* and palatable.

Due to bitter and astringent taste of *Triphala* in the powder form is a major complaint of the patients. So, discover that form of *Triphala*, which is easy to take, effective in low dose, has long shelf life and simple to dispense is the need. *Kajjali* (combination of mercury and sulpher) possess

Yogavahi (increasing potency of formulation and not altering the pharmacological action of contents in combinations) property and is one of the main ingredients in about 80 formulations mentioned in the Ayurvedic formulary of India (AFI), which covers a wide range of therapeutic applicability.[1-5] It is reported that when herbal powder is triturated with the *Kajjali*, the drug becomes potent and is effective in low dose. Such references can be traced in *Rasataragini* where various herbomineral preparations of *Kajjali* are used in different conditions. For example, *Kajjali* is given with *Triphala Churna, Shuddha Guggulu* triturated in oil of *Eranda Taila* (Ricinus communis L.) for the management of *Vata Roga.*[1] These references indicate the need for research in doses form of *Sukshma Aushadhi Kalpana* effective in low dose, which can be applied for Ayurvedic classical drugs. *Sukshma Aushadhi* can be effectively used after assessing *Hetu, Linga, Nidana* causes of disease according to Ayurveda proper diagnosis, as also mentioned in symptoms *Sukshma Aushadhi Kalpana*.[1]

In the case of internal administration of herbomineral drug, it should be safe, effective and free from adulteration, with appropriate quantity and ingredients. It is difficult to identify herbal drug in dry or powdered form. So, it is a need of time to set proper parameters for standardization of herbal drugs. Pharmacognostical studies reveals plant identification and sets parameters for standardization which can be done in the case of herbal traditional medicine. Generally, physiochemical analytical study of drugs help to interpret the pharmacokinetics and pharmacodynamics involved. With the help of physiochemical analytical studies, it is possible to standardize the drug and differentiate the adulterants. High performance liquid chromatography (HPLC) and thin-layer chromatography (TLC) are the conventional methods used in the analysis of secondary metabolites originating from plants. It is necessity of time in the field of *Ayurveda* to go for quality control of the raw drugs as well as final products using modern parameters which provides credibility to *Ayurvedic* medicines and also help in the globalization of *Ayurveda.* Hence to evaluate the Authenticity of *Triphala Kajjali* tablet through various pharmacognostical procedures, and to develop the pharmacognostical and phyto-chemical profile of *Triphala Kajjali* tablet, the present study was carried out.

METHODS

Collection, identification and authentication of raw drugs

The raw materials were procured from the pharmacy of Gujarat Ayurved university, Jamnagar. and the raw drugs were identified and authenticated in the pharmacognosy laboratory of Institute for post graduate teaching and research in Ayurveda, Gujarat Ayurved university, Jamnagar.

The ingredients and part used of the *Triphala Kajjali* tablet are given in Table 1.

Table 1: Ingredients of *Triphala Kajjali* tablet.

Drug Name	Latin name	Part used	Proportion (%)	Form of the drug
Haritaki	*Terminalia Chebula* Retz.	*Phala*	30	Powder
Amalaki	*Emblica officinalis* Gaertn.	*Phala*	30	Powder
Bibhitaki	*Terminalia Bellerica* Roxb.	*Phala*	30	Powder
Kajjali	Mercury Sulphide (HgS)	-	10	-

Preparation of drug

Fine powder of *Haritaki, Bibhitaki* and *Amalaki* was prepared. Then fine powder of *Triphala* was triturated along with *Kajjali*. Water was added till the mixture completely mixed with it and trituration was carried out till the mixture got semisolid form and after it was dried in the oven and granules were made. Then granules were mixed with slight amount of starch and kept in tablet punching machine. Then tablet of 250 mg was prepared and stored in bottles under hygienic condition.

Pharmacognostical study

The pharmacognostical study was divided in to organoleptic study and microscopic study of the finished product.

Organoleptic study

The genuinity of the polyherbal formulation can be fined with organoleptic characters of the given sample. Organoleptic parameters comprise taste, color, odor and touch of *Triphala Kajjali* which was scientifically studied as per the standard references.[1]

Microscopic study

Triphala Kajjali was powdered and dissolved with water and microscopy of the sample was done without stain and after staining with phloroglucinol and HCl. Microphotographs of *Triphala Kajjali* were also taken under Corl-zeisstrinocular microscope.[1]

Physico-chemical analysis

With the help of various standard physico-chemical parameters, *Triphala Kajjali* tablet was analysed. The common parameters mentioned for *Vati* (tablet) *Kalpana* in Ayurvedic Pharmacopeia of India, and CCRAS, guidelines are loss on drying, hardness, total Ash value, acid insoluble ash, pH value, water soluble extract, methanol soluble extra total ash and water and alcohol soluble extractives.[1,2]

High performance thin layer chromatography[1]

High performance thin layer chromatography (HPTLC) is a powerful analytical method suitable for the separation and quantitative determination of a considerable number of compounds even from complicated matrix. HPTLC is used for identification of active constituents, identification and determination of impurities and quantitative analysis of active constituents. Principle of HPTLC remains the same as of TLC i.e., adsorption. One or more compounds can be spotted in a thin layer of adsorbent coated on a chromatographic plate. The mobile phase solvent flows through because of capillary action against gravitational force. The component with more affinity towards stationary phase travels faster. Thus, the components are separated on a thin layer chromatographic plate based on the affinity of the components towards the stationary phase.

RESULTS

The initial purpose of the study was to confirm the authenticity the drugs used in preparation of *Triphala Kajjali* tablet. For this, coarse powder of all ingredients was subjected to organoleptic and microscopic evaluations separately to confirm the genuineness of all the raw drugs. Later after the preparation of formulation, pharmacognostical evaluation was carried out.

Organoleptic evaluation

organoleptic features like color; odor and taste of the *Triphala Kajjali* tablet were recorded and are placed in Table 2.

Table 2: organoleptic characters of *Triphala kajjali* tablet.

Parameter	Results
Color	Dark brownish black
Odor	Irritant
Test	Astringent
Consistency	Fine coarse powder

Microscopic evaluation

Microscopic evaluation was conducted by dissolving powder of *Triphala Kajjali* tablet in the distilled water and studied under microscope for the presence of characteristics of ingredient drugs. The diagnostic characters are black debris of *Kajjali* (Figure 1 A), starch grains of *Haritaki* (Figure 1 B), groups of sclereids of *Bibhitaki* overlapped with *Kajjal i*(Figure 1 C), scleroids of *Amalaki* coated with *Kajjali* (Figure 1 D), trichome of *Bibhitaki* (Figure 1 E), stone cell of *Bibhitaki* covered with *Kajjali* (Figure 1 F), silica deposition of *Amalaki* (Figure 1 G), stone cell of *Haritaki* (Figure 1 H), fibers of *Amalaki* (Figure 1 I), tannin content of *Haritaki* (Figure 1 J), group of scleroids (Figure 1 K), lignified stone cell of *Haritaki* (Figure 1 L), lignified scleroids of *Haritaki* (Figure 1 M), lignified scleroids of *Bibhitaki* coated with *Kajjali* (Figure 1 N), epicarp cell coated with *Kajjali* (Figure 1 O).

Physico-chemical parameters

Physico-chemical parameters like loss on drying, pH values were found within the normal range. Methanol and water-soluble extractive values of *Triphala Kajjali* were found to be 25.9% and 5.9% respectively. Details is shown in the Table 3.

Table 3: Physico-chemical analysis of *Triphala Kajjali* tablet.

Parameter	Value (%)
Loss on drying (w/w)	5.5
Ash value (w/w)	4.03
Water soluble extract (w/w)	5.89
Methanol soluble extract (w/w)	25.96
pH (by pH indicator paper)	4.5
Weight variation of tablet (gm)	Average weight 0.270
	Highest weight 0.307
	Lowest weight 0.243
Hardness of tablet (kg/cm^2)	2.05

High performance thin layer chromatography

Densitometry scanning of the HPTLC pattern showed 07 spots at corresponding Rf values 0.05, 0.11, 0.39, 0.58, 0.69, 0.77 and 0.81 in short wave UV 254 nm and 07 spots at corresponding Rf values 0.05, 0.18, 0.77, 0.81, 0.91, 0.92 and 0.96 obtained in long wave UV 366 nm (Table 4). Though it is not possible to identify particular chemical constituent from the spot obtained, the pattern may be used as a reference standard for further quality control researches.

Table 4: R_f Values of *Triphala Kajjali* tablet.

Variable	R_f value at 254 nm	R_f value at 366 nm
HPTLC	0.05, 0.11, 0.39, 0.58, 0.69, 0.77 and 0.81	0.05, 0.18, 0.77, 0.81, 0.91, 0.92 and 0.96

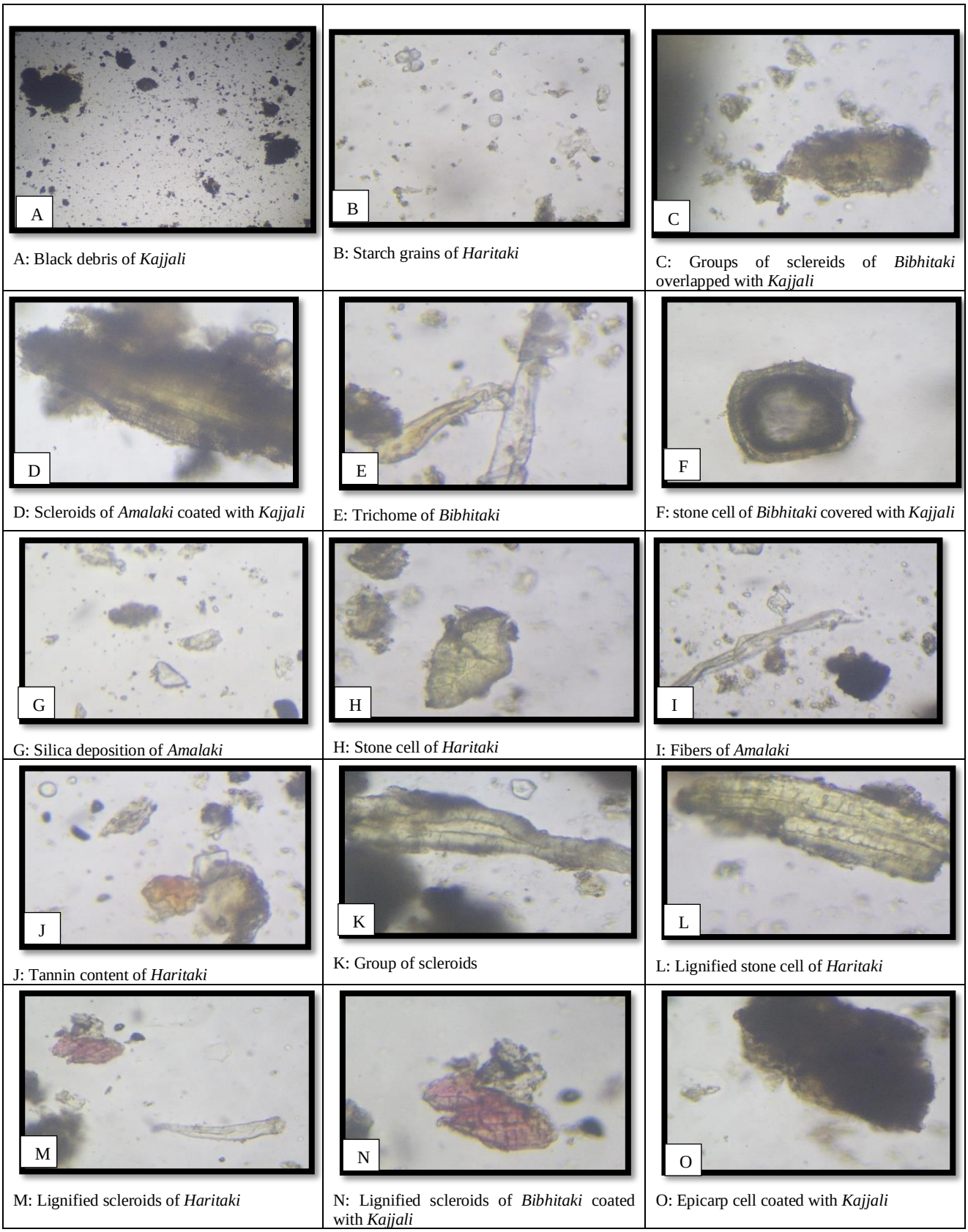

Figure 1: Microphotograph of *Triphala Kajjali* tablet.

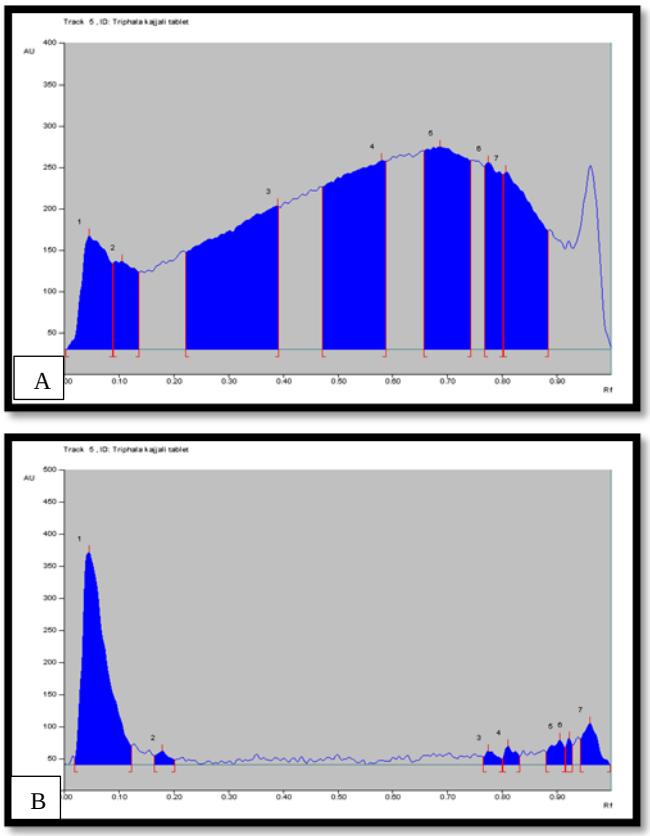

Figure 2: Densitogram of *Triphala Kajjali* tablet at (A) 254 and (B) 366 nm.

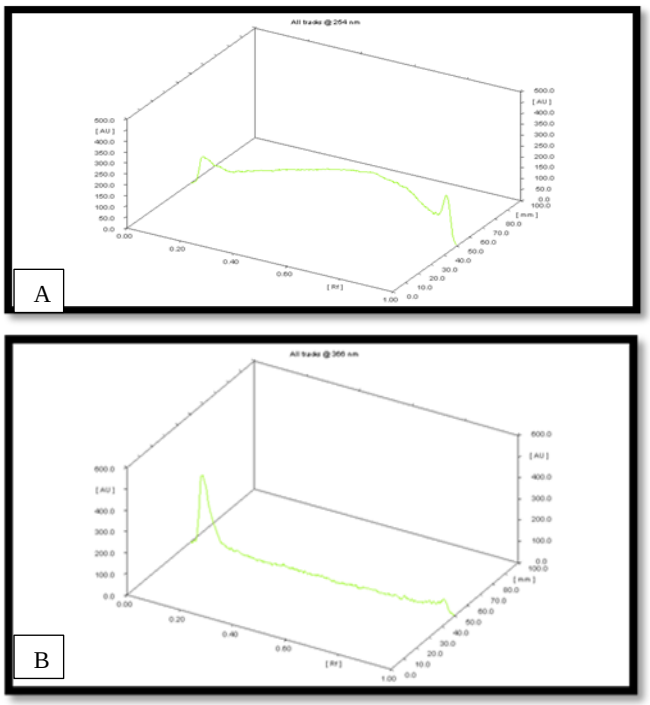

Figure 3: Three dimensional HPTLC (3D) densitogram of *Triphala Kajjali* tablet at (A) 254 and (B) 366 nm.

DISCUSSION

Study on *Triphala Kajjali* tablet was a step towards pharmacognostical and pharmaceutical standardization of the drug. The pharmacognostical study revealed the presence of the diagnostic characters of *Triphala Kajjali* tablet like scleroids of *Amalaki*, trichomes of *Bibhitaki*, stone cell of *Haritaki* and *Bibhitaki*, black debris of *Kajjali*, fibers of *Amalaki*, lignified stone cell of *Haritaki*, lignified scleroids of *Haritaki*, lignified scleroids of *Bibhitaki* coated with *Kajjali* and tannin content of Haritaki.[1] This confirms the presence of all ingredients of raw drugs in the final product and there is no major change in the microscopic structure of raw drug during the pharmaceutical process of preparation of tablet, this showed the genuinity of the final product**.** The Physico-chemical parameters showed that the ash values are the criteria to identify the impurity of drugs. *Triphala Kajjali* tablet contained 4.03% w/w total ash. The results revealed that *Triphala Kajjali* tablet is free from unwanted organic compounds and production site was good enough keeping sample free from dust and other solid matters. The 5.89 w/w of water-soluble extractives and 25.96 % w/w methanol soluble extractives were present in *Triphala Kajjali* indicates that drug is having good solubility in water and methanol. In HPTLC study 7 spots at 254 nm and 7 spots at 366 nm were obtained, indicating its possible components of matrix which may possess its therapeutic effect.

CONCLUSION

The pharmacognostical and Physico chemical analysis of *Triphala Kajjali* tablet confirmed the purity and genuinity of the drug. As no standard fingerprint is available for this formulation, an attempt has been made to evolve pharmacognostical and physico-chemical profiles of *Triphala Kajjali* tablet. Information acquired from this study may be beneficial for further research work and can be used as a reference standard for quality control researches.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Sharma S, Tarangini R, ed Shashtri K. Banarasidas ML. Varanasi reprint, 11th ed, 2009;6:112-26.
2. Shah DP, Zala V, Damre A, Sathaye SS. Evaluation of bioavailability enhancement by Kajjali, an ayurvedic proprietary herbomineral product, Conference Paper in Drug Metabolism Reviews, 16th North American Regional International society for the study of xenobiotics Meeting, October 2009. Available from: www.issx.

confex.com/issx/16na/webprogram/paper17724.html. Accessed on 16 July 2015.
3. The Ayurvedic Formulary of India, Department of Indian Systems of Medicine and Homeopathy, Ministry of Health and Family Welfare, Govt. of India, New Delhi, 2003, 2nd ed, Part I. Available at: https://dravyagunatvpm.files.wordpress.com/2009/02/afi-part-i_part_a_formulations1.pdf
4. The Ayurvedic Formulary of India, Department of Indian Systems of Medicine and Homeopathy, Ministry of Health and Family Welfare, Govt. of India, New Delhi, 2000, 1st ed, Part II. Available at: https://dravyagunatvpm.files.wordpress.com/2009/02/afi_part_ii_formulations.pdf
5. Sadananda S, Tarangini R. In: Shastri K, editor. 6/124. New Delhi: Motilal Banarasidas; 1970;127.
6. Sukshma Aushadhi Kalpana Written and published by Pra. Vaidya Narahar Bhole Prabhu pratham aawritti. 2014;14.
7. Trease, Evans. Pharmacognosy, 15th Ed, WB Sunders Company Ltd. 1996;569-70.
8. Wallis TE. Text book of Pharmacognosy, 5th Ed, New Delhi: CBS Publishers and Distributors. 2002;123-32:210-5.
9. Ayurvedic pharmacopeia of India part 1 vol I. Available at: http://www.ayurveda.hu/api/API-Vol-1.
10. CCRAS. General guidelines for drug development of ayurvedic formulations. 2009.
11. Planner Chromatography, Modern Thin layer Chromatography, Switzerland. 1999;2-16.
12. Ayurvedic pharmacopeia of India part 1 vol I. pdf Available at https://dravyagunatvpm.files.wordpress.com/2009/02/api-vol-1-monographs1.pdf. Accessed on Accessed on 16 July 2015.

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