



Research Article

QUALITY CONTROL PARAMETERS OF VATARI GUGGULU- AN AYURVEDIC FORMULATION

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ABSTRACT

Vatari Guggulu has been prepared according to *Bhaishajya Ratnavali* and is indicated in *Amavata*, *Gridhrasi*, *Katishula* etc. It is an example of *Guggulu kalpa* in *Vati* form which means medicines containing equal or more amount of *Guggulu* as compared to amount of other ingredients. *Vatari Guggulu* is prepared from Castor oil, *Gandhaka* (Processed Sulphur), *Triphala* (*Haritaki*, *Bibhitaki* and *Amalaki*) and *Guggulu*. The present study deals with development of pharmacognostical and preliminary pharmaceutico-analytical profile of *Vatari Guggulu* which is lacking. It revealed the pH (5% aqueous suspension) is 4.0, water-soluble extractive 29.1% w/w, alcohol-soluble extractive 41.84% w/w, carbon di sulphide extractive 22.76% w/w, petroleum ether soluble extractive 15.48% w/w, ash value 14.77% w/w and loss on drying (at 105°C) are 8.35%w/w. Physical tests revealed average weight of *Vatari Guggulu vati* is 376 mg and 7.51 mm diameter and has an average 2.18 kg/cm² hardness, disintegration time 2 hr 45 min (in distilled water) and 0.00043% friability. High performance thin layer chromatography (HPTLC) of alcoholic extract of drug revealed 6 and 5 R_f values at 256 and 366 nm out of which only one R_f was similar among R_f values at either wavelength.

KEYWORDS: Ash value, Disintegration time, HPTLC, Pharmacognosy, *Vatari Guggulu*.

INTRODUCTION

Guggulu is an exudate obtained in the form of oleo-gum resin from the stem of *Commiphora mukul* (Hook ex. Stocks), belonging to family Burseraceae. It is known to have analgesic and anti-inflammatory properties.^[1] *Guggulu* is the principal ingredient of several Ayurvedic therapeutic formulations. Medicines, such as *Yogaraja guggulu*, *Rasnadi guggulu*, *Vatari guggulu* are traditionally used for musculoskeletal problems, body pain, Osteoarthritis, Sciatica and Rheumatoid arthritis etc. since ancient time. *Vatari Guggulu*; a herbo-mineral formulation, is being used for *Amavata*, *Katishula*, *Gridhrasi*, *Khanjata*, *Panguta*, *Vatarakta*, *Shotha* etc.^[2] The preparation of *Vatari Guggulu* is based on traditional method mentioned in *Bhaishajya Ratnavali*. Present work was carried out to standardize and to develop the Quality parameters of *Vatari Guggulu*.

MATERIALS AND METHODS

Collection and authentication of raw drugs

Ingredients of *Vatari Guggulu* was obtained from Pharmacy of Gujarat Ayurved University, Jamnagar. API

standards were used for pharmacognostical authentication of *Eranda*^[3], *Guggulu*^[4], *Gandhaka*^[5], *Haritaki*^[6], *Bibhitaki*^[7] and *Amalaki*^[8] based on morphological features, organoleptic characters and powder microscopy of individual drugs.

Method of preparation of *Vatari Guggulu*

Vatari Guggulu is mentioned in *Bhaishajya Ratnavali*. The main ingredients of *Vatari Guggulu* are Castor oil, *Shuddha Gandhaka*, *Triphala* and *Shuddha Guggulu*. *Guggulu* is made soft by adding sufficient quantity of Castor oil and pounding. Powders of other drugs and remaining castor oil were also added little by little and mixed well by lavigation in edge runner.^[9] Bolus of mixture was fed to stick making machine and pills were prepared by Pill making machine. Pills were subjected to drying in industrial tray drier for complete drying bellow 70°C and packed. After completion of the Pharmaceutical process, *Vatari Guggulu* was subjected to analysis.

Table 1: Ingredients of *Vatari Guggulu*

S.No.	Drug	Latin Name	Part Used	Proportion
1.	<i>Eranda</i>	<i>Ricinus communis</i> Linn.	Seed oil	1 Part
2.	<i>Guggulu</i>	<i>Commiphora mukul</i> Hook Ex. Stocks	Exudate	1 Part
3.	<i>Gandhaka</i>	Sulphur	Processed powder	1 Part
4.	<i>Haritaki</i>	<i>Terminalia chebula</i> Retz.	Pericarp	1 Part
5.	<i>Bibhitaki</i>	<i>Terminalia belerica</i> Roxb.	Pericarp	1 Part
6.	<i>Amalaki</i>	<i>Emblica officinalis</i> Gaertn.	Pericarp	1 Part

Pharmacognostical evaluation

Pharmacognostical analysis of *Vatari Guggulu* comprises of organoleptic characters (i.e. colour, odor, taste and texture) and microscopic studies. Small quantity of *Vatari Guggulu* was mixed with distilled water, filtered

through filter paper. The precipitate was treated with and without stain to find out the lignified material along with other cellular components. These findings were compared with the characters of individual components of *Vatari*

Guggulu. The microphotographs were taken under Carl zeiss binocular microscope attached with camera.^[10,11]

Physicochemical evaluation

Vatari Guggulu was analyzed through relevant physicochemical parameters. Physical tests like average weight of *Vati*, average diameter, average hardness, disintegration time and friability, loss on drying, ash value and chemical tests like water-soluble extractive, alcohol-soluble extractive, petroleum ether soluble extractive, carbon disulphide extractive and pH value were conducted.^[12,13] In qualitative analysis, presence of functional groups like tannins, fats, starch, protein, alkaloids, saponins, sulphate and thiosulphates were assessed. High performance thin layer chromatography (HPTLC) is carried out with methanolic extract of *Vatari Guggulu*.^[14]

High Performance Thin layer chromatography

Methanolic extract of *Vatari Guggulu* was spotted on pre-coated silica gel GF 60₂₅₄ aluminum plate by means of Camang Linomat V sample applicator fitted with a 100- μ L Hamilton syringe. Chloroform: MeOH (9:1) was used as the mobile phase. After development, densitometric scan was performed with a Camag TLC

scanner III in reflectance absorbance mode at UV detection as 254 nm and 366 nm under the control of Win CATS Software (V 1.2.1. Camag). Then the plate was sprayed with vanillin sulfuric acid followed by heating and then visualized in daylight.

OBSERVATION AND RESULTS

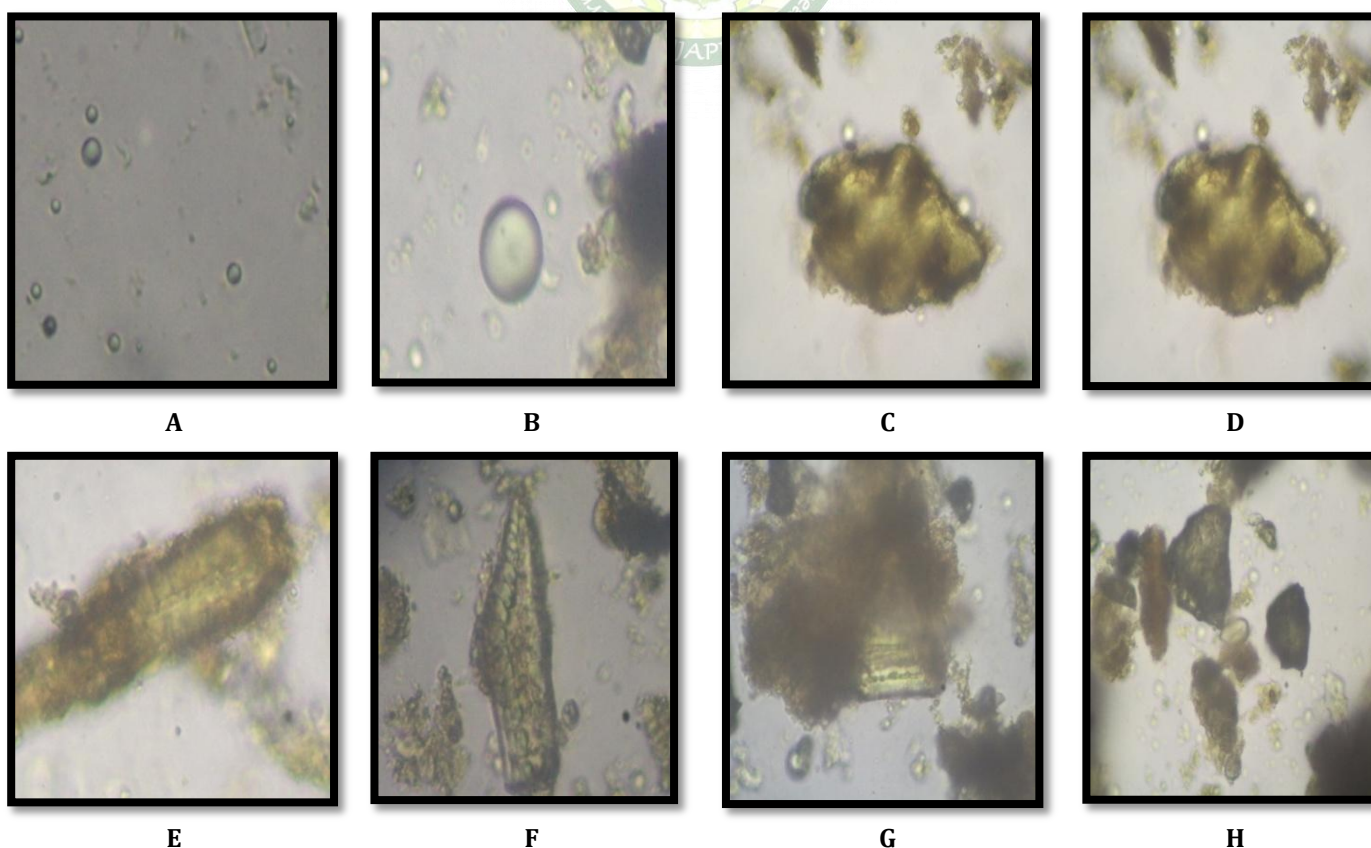
Pharmacognostical analysis

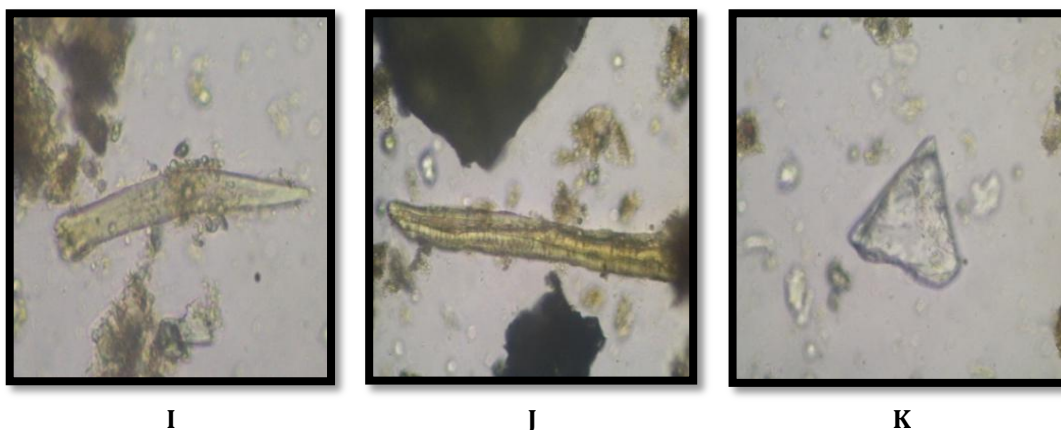
Detailed pharmacognostical evaluation was carried out for all ingredients of *Vatari guggulu*. Organoleptic characters of *Vatari Guggulu* are placed in Table 2 powder microscopy of *Vatari Guggulu* showed striking characters of all individual components of *Vatari Guggulu*. Microscopy of *Ricinus communis* Linn. showed features like; Aleurone grains [Plate 1A], Oil globule [Plate 1B]. *Terminalia chebula* Retz. showed; Brown content [Plate 1C], Disturbed walls stone cells [Plate 1D], Disturbed scleroid [Plate 1E], Stone cells [Plate 1F]. *Terminalia belerica* Roxb. showed; Scleroids [Plate 1G], Simple starch grains [Plate 1H], Trichome [Plate 1I]. *Emblica officinalis* Gaertn. showed; Scleroids [Plate 1J], Silica deposition [Plate 1K]. The diagnostic features obtained by powder microscopy were found to be complying with the standards mentioned at respective volumes of API.

Table 2: Organoleptic tests of *Vatari Guggulu*

S.No.	Parameter	Observation
1.	Colour	Black
2.	Taste	<i>Kashaya</i>
3.	Odour	Aromatic
4.	Touch	Hard
5.	Shape	Oval
6.	Form	Pills

Plate No.1 Microphotographs of *Vatari Guggulu*





(A) Aleurone grains of *Eranda*; (B) Oil globule of *Eranda*; (C) Brown content of *Haritaki*; (D) Disturbed walls stone cells of *Haritaki*; (E) Disturbed scleroid of *Haritaki*; (F) Stone cell of *Haritaki*; (G) Scleroids of *Bibhitaki*; (H) Simple starch grains of *Bibhitaki*; (I) Trichome of *Bibhitaki* (J) Scleroids of *Amalaki*; (K) Silica deposition of *Amalaki*

Physico-chemical tests

Vatari Guggulu was analyzed using relevant physical and physico-chemical parameters at the pharmaceutical chemistry lab. The observations are presented in Table 3 & 4. Presence of tannins and fats was confirmed through the suitable tests while alkaloids could not be detected in *Vatari Guggulu* [Table 5].

Table 3: Physical tests of *Vatari Guggulu*

S.No.	Parameter	Result
1.	Shape	Spherical Mean diameter - 0.75131 ± 0.043157 cm, (Mean \pm SD)
2.	Mean weight of each pill	376.35 ± 72.1192 mg (Mean \pm SD)
	Wt variation ^[15]	Didn't passed test for weight variation for permissible 5% deviation as per API No of pills (out of 20) within range of Average wt $\pm 5\%$ = 6 No of pills (out of 20) out of range of Average wt $\pm 5\%$ = 14
3.	Average Hardness ^[16]	2.18 kg/cm ² by mosanto hardness tester
4.	Average friability ^[17]	0.00043% (IP) at 22 humidity, 35°C temperature
5.	Disintegration time ^[18]	Distilled water - 2 hrs 45 min Acidic buffer - 2 hrs 30 min

Table 4: Physico-chemical tests of *Vatari Guggulu*

S.No.	Parameter	Result
1.	Carbon di sulphide extractive	22.76% w/w
2.	Alcohol soluble extractive	41.84% w/w
3.	Petroleum ether soluble extractive	15.48 % w/w
4.	Water soluble extract	29.01% w/w
5.	Loss on drying	8.35% w/w
6.	Ash value	15.77% w/w
7.	pH (5% aqueous suspension)	4.0

Table 5: Functional groups of *Vatari Guggulu*

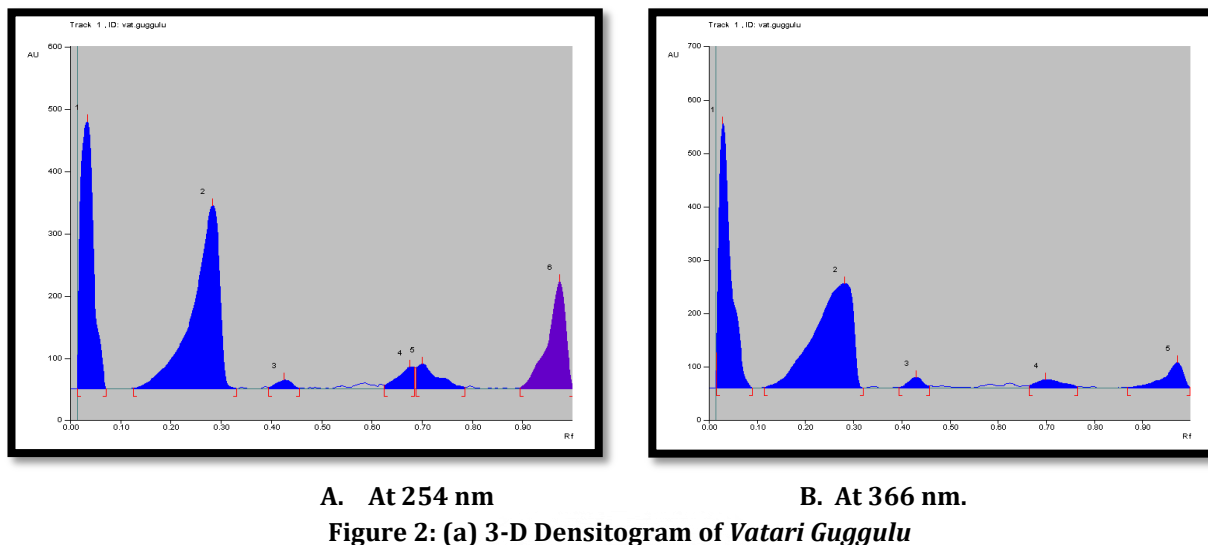
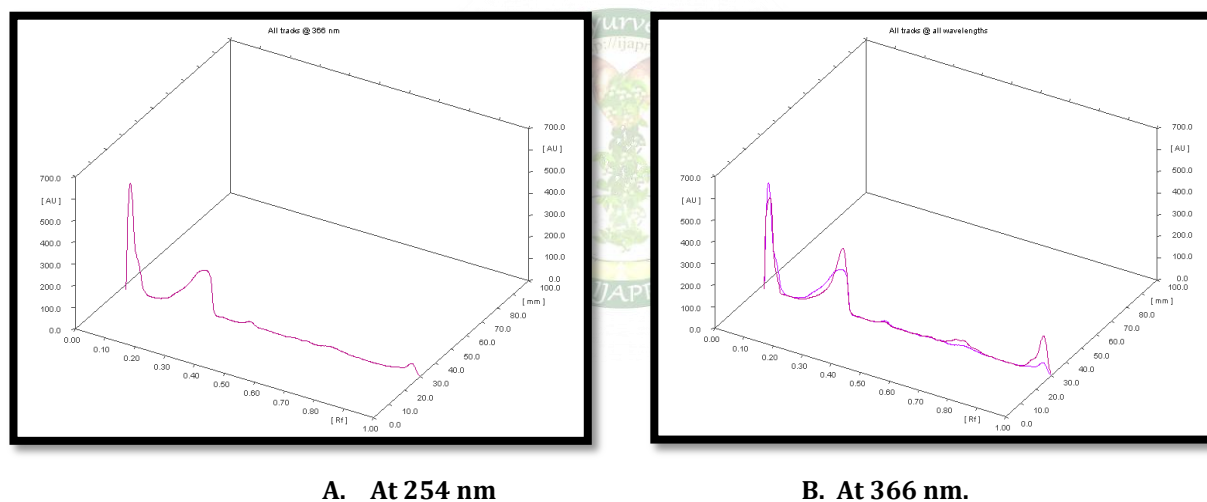
S.No.	Functional group	Method/ reagent	Inference
1.	Tannins	FeCl ₃	Present ^[19]
2.	Starch	Iodine solution	Absent ^[20]
3.	Proteins	Pot. ferrocyanide, Cu So ₄ and Na OH	Absent ^[21]
4.	Fats	Emulsion test	Present ^[22]
5.	Sulphate	IP, BaCl ₃	Absent ^[23]
6.	Thiosulphate	IP	Absent ^[24]
7.	Saponins	Froth test	Absent ^[25]
8.	Alkaloids	Wagners reagent, Mayers reagent	Absent ^[26]

HPTLC

On analyzing under densitometer at 254 nm, the chromatogram showed six peaks. While at 366 nm, the chromatogram showed five peaks.

Table 6: Showing HPTLC peaks

HPTLC	Spots	R _f values at 254 nm
	6	0.01, 0.13, 0.39, 0.62, 0.69, 0.89
	5	R _f values at 366 nm
		0.02, 0.11, 0.39, 0.66, 0.87

Figure 1: (a) Densitogram curve of methanol extract of *Vatari Guggulu*Figure 2: (a) 3-D Densitogram of *Vatari Guggulu*

DISCUSSION

Powder microscopy of *Vatari Guggulu* showed disturbed walls stone cells of *Haritaki*; disturbed scleroid of *Haritaki*; stone cell of *Haritaki*; scleroids of *Bibhitaki* are striking characters of all individual drugs. This confirms the presence of ingredients in finished product and there is no major change in the microscopic structure of raw drugs during pharmaceutical processes of preparation of *Vatari Guggulu*.

Pills consisting of only purified *Guggulu* did not disintegrate even after twenty hours either in acidic or alkaline liquid^[27] hence attempts had been made to add disintegrants in view of reduction of disintegration time formulations of *Guggulu*^[28]. However, published research works on *Guggulu Kalpa* reveals that many formulations have less than 2.5 hrs disintegration time^[29-33]. Above values of Disintegration and hardness of *Vatari Guggulu* match with the range of values of other *Guggulu* formulations. Physical constant of *Vatari Guggulu* shows

that maximum part of it will get disintegrated in to stomach. Acidic media is less likely to have significant impact on its disintegration. It has acceptable hardness and friability. Significant quantity of Carbon disulphide extractive is due to *Shuddha Gandhaka* which can be considered as differentiating parameter from many other *Guggulu* formulations. It is judiciously designed formulation where *Shuddha Gandhaka* and castor oil might act as disintegrants. *Triphala* may facilitate dissolution.

No change in morphology of pharmacognostic features of representing tissues of respective herbal ingredients may be considered as parameter for differentiation of method of preparation of *Guggulu* formulation from *Agnipaki* method (heating to stage of *Guggulu paka*), however systematic study is needed to differentiate method of preparation of *Guggulu* formulation from pharmacognostic features of herbal ingredients.

Vatari Guggulu does *Amapachana* by the properties of *Laghu*, *Ruksha*, *Tikshna Guna*, *Katu*, *Tikta Rasa*, *Ushna Virya*, and *Katu Vipaka*, all of which acts against the *Guru*, *Snigdha*, *Pichhila*, etc. properties of *Ama*. Later, the imbalance of *Kapha* and *Vata* is checked by the *Vata Kapha Shamaka* action of the drug. Further, *Ama* formation is stopped by the *Dipaniya* action. It relieves the symptoms of *Sandhishoola*, *Sotha*, *Aruchi* etc., by its *Vednasthapana* and *Sothahara* action. Also the associated symptoms like *Vibandha*, *Anaha* etc., are reduced by *Anulomana* and *Virechan Karmas* of the drugs like *Haritaki* and *Erand taila*. *Amalaki* and *Gandhaka* has *Rasayana* effects Thus, due to its *Deepana-Paachana* and *Vata Kapha Shamaka* properties, it is very suitable for interrupting the pathogenesis of the disease and to combat the main culprits, i.e., *Vata*, *Kapha (Ama)*, and *Mandagni*, that are the root cause of *Amavata*.

CONCLUSION

Vatari Guggulu in *Vati* form with an average weight of 376 mg and 7.51 mm diameter has an average 2.18 kg/cm² hardness, 90 min. disintegration time 2 hr 45 min (in distilled water) and 0.00043% friability. Significantly more Carbon di sulphide (22.76%), Alcohol soluble extractive (41.84%) and positive emulsion test are due to Free Sulfur and castor oil which may be differentiating features from many other *Vati* formulations of *Guggulu*. Densitogram curve of methanolic extract with 6 and 5 R_f values at 254 and 366nm respectively, presence of striking features of individual ingredients in microscopy, tests for functional groups along with results of physicochemical tests can be referred as quality standards of *Vatari Guggulu*.

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