

Physico-chemical Standardization and HPTLC Study of *Shilajatvadi Vati* – An Ayurvedic Herbomineral Formulation

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ABSTARCT

Ayurveda has the potential with dealing natural and holistic approach of treatment and may be proven more effective as the conservative management proposed for *Mootraghata* (BPH). Due to deranged function of *Vata*, particularly *Apana Vata* perturbed with *Kapha Dosha* which is the prime causative factor to produce the *Mootraghata*. Hence the line of treatment is instituted in this study as *Vata-Kaphahara* properties, *Srotoshodhana*, *Lekhana*, *Chedana*, *Shophahara*, *Mootrala* and *Bastishodhana* along with *Dipana-Pachana Karma* are helpful to break the *Samprapti* of *Mootraghata* (BPH) and bring the vitiate *Dosha* and *Dhatu* into equilibrium. There has been an increase in demand for the Phyto-pharmaceutical products of Ayurveda so a new pharmaceutical preparation in the form of was tried to standardize which is economical in terms of time and machinery usage. The present work was carried out to standardize the finished product *Shilajatvadi Vati* to confirm its identity, quality and purity. *Vati* is standardized using different parameters like physico-chemical parameters include loss on drying, ash value, extractive value, weight variation, hardness etc. by following standard procedures as per Ayurvedic pharmacopeia of India and chromatographic examination includes HPTLC study. Physico-chemical analysis revealed that loss on drying was found 5.20 % w/w, ash value 41.54% w/w, acid insoluble ash 18.86 %w/w, pH 6, methanol soluble extractive value 15.77%w/w whereas water soluble extractive value was found 31.3%w/w. HPTLC study shows 4 spots in 254 nm and 366nm. The parameters evaluated can be used as reference for further research work.

KEYWORDS: Ayurvedic formulation, *Mootraghata* (BPH), Physico-chemical, *Shilajatvadi Vati*.

INTRODUCTION

Sushruta “The Pioneer of Indian Surgery” has been explored the subject of urology nicely and he was the first person described the diseases of urinary system elaborately i.e. *Ashmaree* (urinary stone), *Mootrakrichchhra* (painful micturation), and *Mootraghata* (suppression or obstruction of urine) along with their management. The description of *Basti* (urinary bladder), *Mootrotpatti* (formation of urine), *Mootravaha Srotasa* (urinary system) and *Shukravaha Srotasa* (reproductive system) is given in a concise way. The word *Mootraghata* comprises of two different words i.e. “*Mootra*” & “*Aghata*”, which stand for low urine output due to obstruction in the passage of urine.

The twelve types of *Mootraghata*^[1] reflect the symptoms of increased frequency, incomplete voiding, urgency, dribbling, hesitancy, incontinence, retention of urine etc. These are basically presented the features related to the Lower Urinary Tract Symptoms (LUTS) and can be co-related with Benign Prostatic Hyperplasia (BPH) in modern vernacular.

Shilajatvadi Vati having properties i.e. *Chedana, Lekhana, Shothahar, Yogvahi, Rasayan and Vata-Kaphashamak*, as work locally on prostatic nodules to reduce the size of prostate gland and post voidal residual urine volume as well as increased average urine flow rate. At the same time it gives strength to the detrusor muscles and sphincters as mentioned of special treatment for *Mootraghata* in *Ayurvedic* classics.^{[2][3]}

Pharmaceutical analysis helps to confirm the quality of finished drug forms. Though principles of drug standardization at different stages of pharmaceuticals (process and finished product) have been highlighted at many instances in *Ayurvedic* treatises it is well-known fact that there has been unprecedented technological advancement. The present study was therefore undertaken to develop standardization parameter for *Shilajatvadi Vati* through the Pharmaceutical standards, organoleptic features and HPTLC were carried out after organizing appropriate solvent system.

MATERIAL AND METHOD

Collection and authentication of raw drugs

The raw drugs for the study were procured from the Pharmacy of Gujarat Ayurved University, Jamnagar. The ingredients were identified and authenticated in the Pharmaceutical chemistry laboratory, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar. The ingredients and the part used are given in table no 1.

Method of Preparation of *Shilajatvadi Vati*^[4]

Shilajatvadi Vati was prepared as mentioned in classics, first of all *Shudhha Shilajit* was taken into medium sized *Kharal*, than all above remaining ingredients were mixed in proportion one by one. After that *Bhavana* (trituration) will be done for 3 consecutive days in *Trijata Kwatha*. At the end of trituration, binding agent was added to get solid form and were made in to *Vati* form with the help of machine. Prepared *Vati* were kept in hot air oven for drying and stored in air-tight glass container.

Organoleptic evaluation

Organoleptic evaluation of *Shilajatvadi Vati* like colour, odour, taste, touch etc. conducted at Pharmaceutical chemistry laboratory of the institute.

Physico-chemical Evaluation

The physicochemical parameters like loss on drying, ash values (total ash and acid insoluble ash) and extractive values (water and alcohol extractive values), pH, weight variation, hardness etc. for *Shilajatvadi Vati* were established by following standard procedures recommended by *Ayurvedic Pharmacopoeia of India* ^[5].

High performance thin layer chromatography^[6]

HPTLC Aluminium pre-coated plate with Silica gel60 GF₂₅₄ was used as stationary phase. Methanolic extract of sample 1mg/ml solution was applied on the plate by mean of Camag Linomate V sample applicator fitted with a 100µl Hamilton syringe. The mobile phase consisted of Toluene: Ethyl acetate a ratio of 9:1 v/v. After development, densitometric scan was performed with a Camag TLC scanner III in reflectance in absorbance mode at 254 and 366 nm under control of Win CATS Software (V1.2.1.Camag).

OBSERVATION AND RESULTS

Organoleptic Evaluation

Various parameters of the material such as colour, odour, touch and taste etc. of the *Shilajatvadi Vati* were observed and recorded. Touch was analysed with the help of *Darshana, Sparshana, Ghrana and Rasana Pareeksha* as mentioned in *Ayurveda*. Results were mentioned in the table no.2.

Physico-chemical Analysis

Physico-chemical analyses were carried out by following the parameters. Physico-chemical analysis i.e. loss on drying, ash value, water soluble extract, alcohol soluble extract, acid value, weight variation, hardness and pH were mentioned in the table no. 3.

HPTLC

High-performance thin-layer chromatography (HPTLC) is an invaluable quality assessment tool for the evaluation of botanical materials. The most critical parameter in achieving a separation with high selectivity is the choice of a stationary and mobile phase. In present work Toluene: ethyl acetate (9:1) v/v is used as mobile phase. Results of HPTLC are given in table no. 4 and densitogram are shown in Figure no. 1 & 2

Table No. 1: Ingredients of *Shilajatvadi Vati*.

S.N.	Ingredients	Latin name/formula	Quantity	Part used
1.	<i>Shudhha Shilajit</i>	<i>Asphaltum Punjabianum</i>	60 gm	<i>Resin</i>
2.	<i>Swarna Makshik Bhasma</i>	Copper pyrite (Cu ₂ S)	12 gm	<i>Bhasma</i>
3.	<i>Abhrak Bhasma</i>	Biotite (mica)	12 gm	<i>Bhasma</i>
4.	<i>Lauha Bhasma</i>	Iron (Fe ₂ O ₃)	12 gm	<i>Bhasma</i>
5.	<i>Vanga Bhasma</i>	Stannous (Sn)/Tin	12 gm	<i>Bhasma</i>
6.	<i>Trinkanta</i> (<i>Amber/Kaharava Pishti</i>)	<i>Pinus Succinifera</i> (<i>Goppert</i>)	6 gm	<i>Pishti</i>

Table No. 2: Organoleptic characters of *Shilajatvadi Vati*.

S. N.	Organoleptic Characters	Results
1.	Colour	Dark Black (<i>Krishna</i>)
2.	Odour	<i>Gomutragandhi</i>
3.	Lustre	<i>Gugguluabha</i>

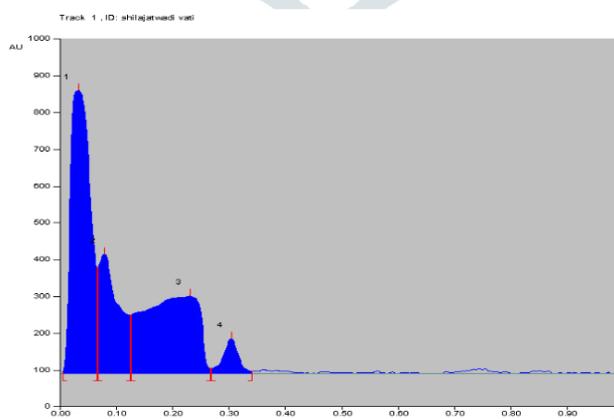
4.	Taste	Astringent-Bitter
5.	Touch/ Texture	Semi solid (<i>Madhyama</i>)
6.	Dissolving in water	Dissolve with give a stream
7.	Reaction on fire	Burn without fumes and give <i>Lingakar Akriti</i>

Table no 3: Physico-chemical analysis of *Shilajatvadi Vati*

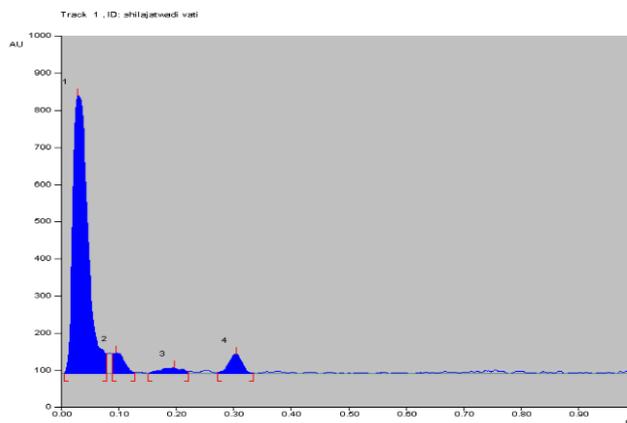
S. N.	PARAMETERS	RESULTS
1.	Loss on drying (At 110° C temp. % w/w)	5.20
2.	Ash Value (% w/w)	41.54
3.	Acid insoluble ash (% w/w)	18.86
4.	Methanol soluble extract value (% w/w)	15.77
5.	Water soluble extract value (% w/w)	31.3
6.	pH	06
7.	Weight variation (mg)	129.45(±5%)
8.	Hardness (kg/cm ²)	3.325

Table No. 4: Results of HPTLC of *Shilajatvadi Vati*.

UV-254nm		UV-366nm	
No. of Spot	Max. Rf value	No. of Spot	Max. Rf value
1	0.03	1	0.03
2	0.08	2	0.10
3	0.23	3	0.20
4	0.30	4	0.30



Densitogram of *Shilajatvadi Vati* at Short ultra violet (254 nm).



Densitogram of *Shilajitvadi Vati* at long ultraviolet (366 nm).

Plate 1: HPTLC evaluation of *Shilajitvadi Vati*

DISCUSSION

Standardization is essential for ensuring the quality of formulation. Organoleptic evaluation showed that organoleptic characters of the *Shilajitvadi Vati* was blackish in colour, *Gomutragandhi* odour, Astringent-bitter in taste, Semi solid in touch and burn without fumes on reaction with fire. Phytochemical analysis showed that Loss on drying was 5.20% w/w as material gains very little moisture during storage, so quality of the product is not affected. An excess of moisture in the drug may encourage microbial growth. Ash value directly indicates the amount of inorganic residue present in the plant. Ash value was found 41.54 w/w whereas acid insoluble was found 18.86 %w/w. Higher ash and acid insoluble ash value is due to the presence of metallic content; as *Shilajitvadi Vati* is a herbo-mineral formulation. Extractive value gives an idea about the type of chemical moieties present in the plant. Methanol soluble extract value was 15.77, Water soluble extract value was 31.3. Water-soluble extractive value has been found more in comparison to the alcohol-soluble extractive value which indicates the probability of the presence of high water-soluble constituents than the alcohol-soluble in the sample. pH was found 6. Average weight was found 129.45 mg and weight variation was found within limits of $\pm 5\%$. Hardness is 3.325 kg/cm². The obtained values of these tests were found within normal limit which indicate good quality of product and better results in the diseases. HPTLC is a powerful analytical tool in the field of analysis. An R_f value is characteristic for any given compound (provided that the same stationary and mobile phases are used). It can provide corroborative evidence as to the identity of a compound. The mentioned R_f in the table may be used for the identification. It may show variation if the mobile phase or ratio of the mobile phase is changed. HPTLC results showed that the 4 spots at 254 nm and 4 spots at 366 nm.^[7]

CONCLUSION

Phyto-chemical evaluation of *Shilajitvadi Vati* showed the specific characters of ingredients which were used in the preparation. Organoleptic features, of *Shilajitvadi Vati* were within the standard range. All the Pharmaceutical parameters analysed within the allowable range and it may be used as standard reference for further research work and clinical studies.

REFERENCES

- ¹ Sushruta, Reprint Sushruta Samhita, Vaidya Yadavaji Trikamji Acharya. Nibandhasangraha Commentary. Su.Utt.58/4. Varanasi: Chaukhamba Surbharati Prakashana. 2008;787
- ² Charaka, Charaka Samhita, with Chakradutta Commentary, Chaukhamba Sanskrita Sansthana, Varanasi, Reprint 2002, Ch.Chi. 1-3/48-62; Sushruta, Sushruta Samhita, Vaidya Yaadavaji Trikamji Acharya, with Nibandhasangraha Commentary, Chaukhamba Surbhaarati Prakashana, Varanasi, Reprint 2008, Su. Chi. 13
- ³ Vagbhata, Rasaratna Samucchaya edited by Ambikadatta Shastri, ed 9th, Adhyaya 2, 3, 4 & 5. Chaukamba Amarabharati Prakashana, Varanasi, 1995.
- ⁴ Rastantra Sara & Sidhha Prayog Sangrah, 21th edition, Dwitiya Khanda, pg. no. 180-81, Krishna Gopal Ayurved Bhavan, Ajmer, 2017.
- ⁵ Anonymous. The Ayurvedic Pharmacopoeia of India. part 2, vol 2, Appendices 1st ed. New Delhi: Govt. of India Publication. 2008; 233-5.
- ⁶ Stahl E. Thin-layer chromatography a laboratory hand book. 2nd edition. New York: Springer-Verlag. 1969;125 -133.
- ⁷ Alagar Raja M, Shailaja V, David Banji, Rao KN, Selvakumar D. Evaluation of standardization parameters, pharmacognostic study, preliminary phytochemical screening and in vitro antidiabetic activity of *Emblica Officinalis* fruits as per WHO guidelines. Journal of pharmacognosy and phytochemistry. 2014; 3(4):21-28.

