ORIGINAL ARTICLE

Comparative study of pharmacognostical and pharmaceutical evaluation of *Shwasahara Dashemani Churna* with different numbers of *Bhavana* (levigation)

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Abstract

Context: Acharya Charaka has grouped the drugs according to their specific mode of action on particular body system and disease, and they can be used as a whole or in different combinations in different dosage forms. *Shwasahara Dashemani* is one among them and contains the 10 drugs. *Bhavana Samskara* (levigation process) is mentioned in Ayurveda to increase the potency of a drug and to reduce the dose. **Aims and Objectives:** To screen the differences in pharmacognostical and pharmaceutical profile of the *Shwasahara Dashemani Churna* prepared with different numbers of *Bhavana*. **Materials and Methods:** Cluster of all the drugs of *Shwasahara Dashemani* was taken as a single combination in the form of *Churna* prepared with single *Bhavana* and another prepared with seven *Bhavanas*. For *Bhavana*, the *Kashaya* of the same drugs of *Shwasahara Dashemani* was used. **Results:** Till date, no research article was found on pharmacognostical evaluation of this drug. The powder microscopy of the *Churna* with one *Bhavana* showed the presence of simple starch grains of *Shathi*, stone cells of *Agaru*, etc., whereas that of another group prepared with seven *Bhavana* showed scleroids of *Agaru* with crushed walls, fibers of *Amlavetasa* with smoothened walls. Loss on drying was higher in the *Churna* with one *Bhavana* while ash value was found higher in *Churna* prepared with seven *Bhavana*. **Conclusion:** There is a definite role of number of *Bhavana* in the drug preparation as there is a change in pharmcognostical characteristics after the *Bhavana*. These changes favor the better absorption, assimilation, and target action with minimal dose.

Key words: *Bhavana, Churna,* pharmaceutical, pharmacognosy, *Shwasahara Dashemani*

INTRODUCTION

Bronchial asthma is a noncommunicable lifestyle disorder. It is a chronic inflammatory condition of the lung airways resulting in episodic airflow obstruction.[1] Asthma is a common chronic disease causing substantial burden often causing a reduced quality of life.[2] Global estimate of asthma suggests that as many as 334 million people have asthma and that the burden of disability is high,[3] and out of which, 1/10th are Indians. Asthma prevalence rates in Karnataka, Gujarat, Haryana, Uttar Pradesh Madhya Pradesh are above the national level.[3] In India, rough estimates indicate a prevalence of between 10% and 15% in 5-11 year old children.[4] It calls the attention of medical world due to significant burden in terms of health-care costs as well as lost productivity and reduced participation in family life. Patients with moderate to severe asthma have to take long-term medication daily (for example, anti-inflammatory drugs) to control the underlying inflammation and prevent symptoms and attacks. If symptoms occur, short-term medications (inhaled short-acting β_2-agonists) are used to relieve them.

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Ayurveda texts have described five types of *Shwasa Roga,* and among these five, *Tamaka* is one. *Tamaka Shwasa* is basically a disorder of *Pranavaha Srotasa,*[5] whereas others *Srotasa* is also vitiated. In this condition, *Vayu* gets vitiated form its normalcy due to obstruction made by *Kapha*. This vitiation leads to severe episodes of breathlessness. The parallel disease entity in the western medicine to this disorder is Bronchial Asthma.

In *Charaka Samhita*, the 50 groups of 10 drugs are mentioned for the management of the different diseases such as *Shwasa* (bronchial asthma), and those clusters of 10 drugs are popularly known as *Dashemani* (group of 10) or *Mahakashaya*. Group of 10 drugs indicated for the management of *Shwasa Roga* named as *Shwasahara Dashemani*.[6] In this study, the cluster of all drugs of *Shwasahara Dashemani* is taken as a single combination in the form of *Churna*. The drug combination *Shwasahara Dashemani* is having properties to remove the obstruction made by *Kapha* in the *Pranavaha Srotasa* and related system and normalize the functioning of *Vayu*. By virtue of *Rasayana* (immune modulator) properties of drugs, they regularize the *Dhatwagni* (tissue metabolism) and promote the immunity and health of the child.

The drugs of *Shwasahara Dashemani* are known for their actions such as the anti-inflammatory action of *Shathi*[7] and *Tulasi,*[8] expectorant action of *Shathi*, *Pushkarmoola*[9] and *Hingu,* mast cell stabilizing and antihistaminic property of *Shathi*,[10] *Pushkarmoola,* and *Jivanti.* Antiasthmatic properties of *Shathi*,[11] *Pushkarmoola*,[12] *Ela,* and *Agaru* and antimicrobial property of *Shathi*,[13] *Pushkarmoola*,[14] *Ela,*[15] and *Jivanti* also have been proven. The carminative action of *Ela*, *Hingu*, *Agaru*,[16] and *Surasa* helps in *Vatanulomana* [Table 1].

NEED AND SIGNIFICANCE OF STUDY

As explained earlier, moderate to severe cases of asthma require long-term medicines, according to Ayurveda too *Muhurmuhu Aushadha* (frequent administration of drug in small quantity) is indicated in *Shwasa Roga*. Administration of drug to children is quite difficult as there is a low palatability to taste and children refuse to multiple administrations of drug in large quantity. Therefore, it is necessary to reduce the dose and number of administration of the drug for childhood illness. To potentiate the drug and reduce its dose to minimal with maximum therapeutic effect, procedure called as *Bhavana Samskara* (levigation process) is mentioned in Ayurveda classics. One can increase the potency of drug with multiple levigation processes.

Bhavana Samskara (Levigation Process)

Churna or powder of different herbal plants is mixed with the different liquids and levigated for particular period or until the mixture gets homogeneous, or until the liquid gets totally absorbed in solid drugs. For the purpose of levigation, different plant juices, decoctions, cow's urine. *Kanji,* etc., can be used. Such a procedure is repeated so that with the increase in number of *Bhavana* there is an enhancement in the efficacy of the drug. Considering the utility of *Bhavana Samskara* of Ayurveda one can definitely reduce the dose of drug to minimum with the highest potency and such a preparations looks to be very useful to treat diseases such as childhood asthma.

Therefore, this study has been conducted to establish the role of *Bhavana* with the pharmacognostical and pharmaceutical evaluation.

Aims and Objectives

1. To evaluate the role of *Bhavana* in drug preparation with the pharmacognostical and pharmaceutical characteristic study of *Shwasahara Dashemani* prepared with one and seven *Bhavana*
2. To study the effect of *Bhavana* theoretically in drug preparation, with pharmacognosy and pharmaceutical study.

Table 1: Ingredients of *Shwasahara Dashemani*

Sanskrit name	Scientific name	Part used	Ratio
Shathi	*Hedychium spicatum*. Ham ex smith	*Shushka Kanda*	2 Part
Pushkaramoola	*Inula racemosa*. Hook.	*Moola*	1 Part
Amlavetasa	*Rheum emodi*. Wall	*Patra*	1 Part
Ela	*Elettaria cardamomum* Maton	*Phala*	1 Part
Hingu	*Ferula narthex* Boiss	*Niryasa*	1 Part
Agaru	*Acquilaria agallocha* Roxb.	*Kashtha*	1 Part
Surasa	*Ocimum sanctum* Linn.	*Panchanga*	1 Part
Tamalaki	*Phyllanthus niruri* Linn.	*Panchanga*	1 Part
Jivanti	*Leptadenia reticulata* W & R	*Panchanga*	1 Part

MATERIALS AND METHODS

Collection of Raw Materials

Among the 10 drugs of *Shwasahara Dashemani* [Table 1], eight drugs were taken from the pharmacy, GAU, Jamnagar, i.e., drugs were *Shathi* (*Hedychium spicatum*. Ham ex smith), roots of *Pushkarmoola* (*Inula racemosa*. Hook. F), leaves of *Amlavetasa* (*Rheum emodi* Wall), fruits of *Ela* (*Elettaria cardamomum* Maton), gum resin of *Hingu* (*E. cardamomum* Maton), heart wood of *Agaru* (*Aquilaria agallocha* Roxb.), whole plant of Tamalaki (*Phyllanthus niruri* Linn.), and *Jivanti* (*Leptadenia reticulata* W & R). Whole plant of *Tulsi* (*Ocimum sanctum* Linn.) was collected from the local market of Jamnagar. As *Chanda* (*Angelica glauca* Edgw.) is a controversial drug and it was not available, in present study, *Shwasahara Dashemani* was prepared with 9 herbs excluding *Chanda*/*Choraka* due to controversy, and *Shathi* was taken as 2 parts to complete the 10 parts of formulation. Their characteristics were confirmed by correlating their morphological and microscopical features with relevant literature.

Preparation of the Drug

All the collected drugs were shade dried and then made into powder form separately with the help of mechanical grinder, sieved through 60# and then mixed together in equal quantity to make homogenous mixture. The prepared powder of *Shwasahara Dashemani* was taken into two groups: Group A and Group B. Group A powder was given one *Bhavana* and group B seven *Bhavana*. For *Bhavna*, the powders were subjected to levigation with the decoction of the same drugs in end runner for one time and seven times in Group A and Group B, respectively. In each *Bhavana*, sufficient amount of decoction made from the same drugs was added to the powder to get it soaked well and then levigated for 6-8 h daily till the decoction gets completely absorbed. After completion of the *Bhavana* process, the obtained powder was dried and filtered through 120# sieve mesh. After that, the drugs were packed and kept in dry place at room temperature.

Pharmacognostical Evaluation

Organoleptic evaluation

Various organoleptic characters such as color, odor, taste, and touch of drugs of both the groups were observed and recorded.[17]

Microscopic evaluation

Sample drug was dissolved in small amount of distilled water for a while and then mounted in glycerin. Powder microscopy of both the samples was carried out without stain and after staining with phloroglucinol + HCL. By powder microscopy, observed the characters and determined the chemical nature of the cell wall along with the form and chemical nature of the cell contents. Microphotographs were taken under Carl–Zeiss trinocular microscope that was attached with the camera.[18]

Pharmaceutical Evaluation

In phytochemical analysis, loss on drying, ash value, water soluble extracts, alcohol soluble extracts, pH value, particle size distribution, etc., were assessed.[19]

High-performance Thin Layer Chromatography (HPTLC)

HPTLC was performed as per the guideline provided by API. Methanolic extract of drug sample was used for the spotting. HPTLC was performed using toluene+ethyl acetate (9:1 v/v) solvent system. The color and Rf values of resolved spots were noted.[20]

RESULTS

Pharmacognostical Evaluation

Organoleptic characters

Results of various parameters such as color, odor, taste, touch, and texture of both the drugs are shown in Table 2. The color of *Shwasahara Dashemani Churna* with one *Bhavana* (Group A) was light brown while the color of the one with seven *Bhavana* (Group B) was dark brown. Both the samples were having slightly aromatic odor. The sample of *Shwasahara Dashemani Churna* with one *Bhavana* possesses pungent taste which ends with bitter while that with seven *Bhavana* having astringent taste which ends with bitter. Touch and texture of the *Churna* with seven *Bhavana* are very fine and soft compared to that with single *Bhavana*.

Microscopic evaluation

The diagnostic characters of microscopic analysis of *Shwasahara Dashemani Churna* prepared with one *Bhavana* showed the presence of fragments of border pitted vessels of *Pushkarmoola*, simple starch grains of *Shathi*, stone cells of *Agaru*, rhomboidal crystals of *Jivanti*, fibers of *Jivanti*, cork cells in surface view of *Agaru*, stone cells of *Pushkarmoola*, perisperm cells of *Ela*, prismatic crystal of *Agaru*, silica deposition of *Shathi*, oil globules of *Tulsi*, scleriform vessels of *Shathi*, group of stone cells of *Pushkarmoola*, simple trichome of *Tulsi*, tannin content of *Pushkarmoola*, epidermal cells of *Bhumyamalaki*, alurine grains of *Ela*, lignified fibers of *Jivanti*, pitted vessels of *Bhumyamalaki*, trichome with oil of *Tulsi*, fibers of *Amlavetasa*, scleroids of *Agaru*, yellow coloring matter of *Amlavetasa* and pitted stone cells of *Agaru* [Plate 1 - 1-24]. The diagnostic characters of microscopic

analysis of *Shwasahara Dashemani Churna* prepared with seven *Bhavana* showed the presence of squashed stone cells of *Pushkarmoola*, scrapped walls of fibers of *Jivanti*, stone cells of *Jivanti* (walls are ruptured), rhomboidal crystals of *Jivanti*, prismatic crystals of *Agaru*, fragment of border pitted vessels (walls ruptured) of *Jivanti*, oil globule of *Ela*, scleroids (walls are crushed) of *Agaru*, fibers of *Amlavetasa* (walls are smoothen), lignified stone cells (walls crushed) of *Pushkaramoola*, disturbed perisperm cells of *Ela* [Plate 2 - 1-11].

Pharmaceutical Analysis

Results of phytochemical analysis such as loss on drying, ash value, water soluble extracts, alcohol soluble extracts, pH value, and particle size distribution are shown in Table 3. Loss on drying at 110°C is the major factor for the stability of the drugs. The result of loss on drying was higher in Group A (with one *Bhavana* - 7.9% w/w) than in Group B (with seven *Bhavana* - 3.3% w/w). The water soluble extract as well as alcohol soluble extract values are higher in Group A with one *Bhavana* (water soluble extract: 29.84% w/w and alcohol soluble extract 17.92% w/w) than that of Group B with seven *Bhavana* (water soluble extract: 24.88% w/w and alcohol soluble extract 12.72% w/w). Total ash value of Group B (with seven *Bhavana*) is higher (9.35% w/w) than in Group A (with one *Bhavana*) that is 4.9 %w/w. pH values of both the groups drugs was observed similar as 3. Particle size distribution showed that in Group A moderately fine particles are maximum (54.75%), whereas, in Group B, moderately coarse particles are maximum (71.23%).

HPTLC Study

The color and Rf values of resolved spots of HPTLC were noted [Table 4]. In HPTLC profile of the methanolic extracts of Group A, 6 spots at Rf 0.01, 0.06, 0.35, 0.41, 0.61, and 0.76 were observed in 254 nm UV light spectrum while 6 spots at Rf 0.01, 0.06, 0.19, 0.35, 0.61, and 0.76 were observed in 366 nm UV light spectrum. In HPTLC profile of the methanolic extracts of Group B drug, 9 spots at Rf 0.01, 0.06, 0.13, 0.18, 0.28, 0.35, 0.42, 0.62, and 0.76 were observed in 254 nm UV light spectrum, while 9 spots at Rf 0.01, 0.06, 0.18, 0.29, 0.35, 0.50, 0.62, 0.77, and 0.88 were observed in 366 nm UV light spectrum. In Group A, 4 spots were found common at short wave and long wave frequency, whereas, in Group B, 5 spots were found common in short wave and long wave UV spectrum [Plates 3 and 4].

DISCUSSIONS

Childhood bronchial asthma is global as well as national burning health issues. There is a great increased drift in the cases of moderate to severe asthma in recent decades. Ayurveda has different herbal drugs to treat asthma. Most of Ayurveda drugs are bitter in taste, and therefore, less palatable in pediatric population. Drug administration protocol for *Shwasa Roga* is frequent administration of drugs. Considering these facts to enhance the potency of dug for dose minimization with less frequent administration is demand of health world. Ayurveda *Bhavana Samskara* is looks very helpful to achieve this goal of childhood asthma management. *Bhavana Samskara* is a levigation of herbal or herbomineral powders with liquids such as plant juices and decoctions until the whole mixture of drugs gets homogeneous. There is increase in potency of drug with multiple application of *Bhavana*. With the application of multiple *Bhavana,* there is levigation for longer time, which makes the greater changes in drugs which are revealed in present study, on the basis of changes observed in pharmacognostical as well as pharmaceutical parameters. The role of *Bhavana Samskara* in changing the physicochemical properties of the drug was also be checked by studying the same combination in two groups; drug of one group was prepared with one *Bhavana* and that of another with seven *Bhavana*. For *Bhavana*, the *Kashaya* of the same drugs was used.

Importance of *Bhavana*

Bhavana, the levigation means mixing the solid matter with the liquid media for a particular time period with the sufficient pressure. It brings minute particles of the material in contact with the liquid media and impregnates properties of the media to the material, transforms coarse powder to finer state, thus increases surface area and thus enhances bioavailability. Moreover, it leads to unique and suitable physicochemical changes.

Pharmacognostical Evaluation

The color change owes to prolonged levigation of Group B. As it is well-known that during levigation, mild heat is generated due to friction which darkens the grinding matter. The sample of *Shwasahara Dashemani Churna* with one *Bhavana* possesses pungent taste which ends with bitter while that with seven *Bhavana* having astringent taste which ends with bitter. The alteration in the *Rasa* might be due to *Vibhaga* (elimination) process carried out during *Bhavana Samskara* of the drugs. Touch and texture of the *Churna* with seven *Bhavana* are very fine and soft compared to that with single *Bhavana* might be due to breakdown of the hard cellular structures and the exposed cellular contents by prolonged levigation of the drug [Table 2].

Microscopic Evaluation

Most of the structures in group B are crushed or ruptured as compared to Group A [Plate 1 - l-24] which may be the result of prolonged levigation. As an outcome locked contents in the cellular compartment are freed; this might result in increased and quick absorption as well as enhanced assimilation and

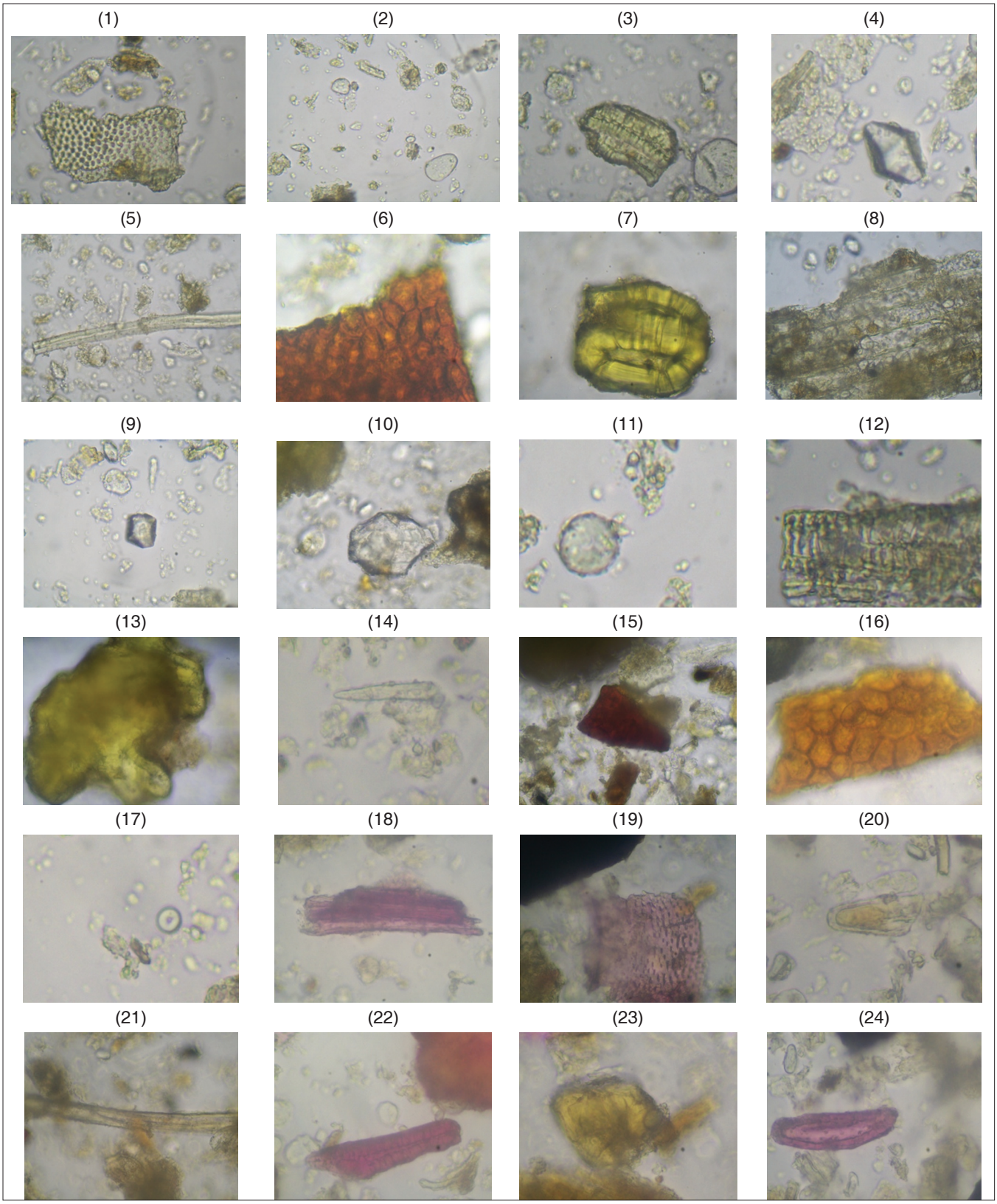

Plate 1: Microphotographs of *Shwasahara Dashemani Churna* with one *Bhavana* (Group A). (1) Fragments of border pitted vessels of *Pushkarmoola*. (2) Simple starch grains of *Shathi*. (3) Stone cells of *Agaru*. (4) Rhomboidal crystals of *Jivanti*. (5) Fibers of *Jivanti*. (6) Cork cells in surface view of *Agaru*. (7) Stone cells of *Pushkarmoola*. (8) Perisperm cells of *Ela*. (9) Prismatic crystal of *Agaru*. (10) Silica deposition of *Shathi*. (11) Oil globules of *Tulsi*. (12) Scleriform vesseis of *Shathi*. (13) Group of stone cells of *Pushkarmoola*. (14) Simple trichome of *Tulsi*. (15) Tannin content of *Pushkarmoola*. (16) Epidermal cells of *Bhumyamalaki*. (17) Alurine grains of *Ela*. (18) Lignified fibers of *Jivanti*. (19) Pitted vessels of *Bhumyamalaki*. (20) Trichome with oil of *Tulsi*. (21) Fibers of *Amlavetasa*. (22) Scleroids of *Agaru*. (23) Yellow coloring matter of *Amlavetasa*. (24) Pitted stone cells of *Agaru*

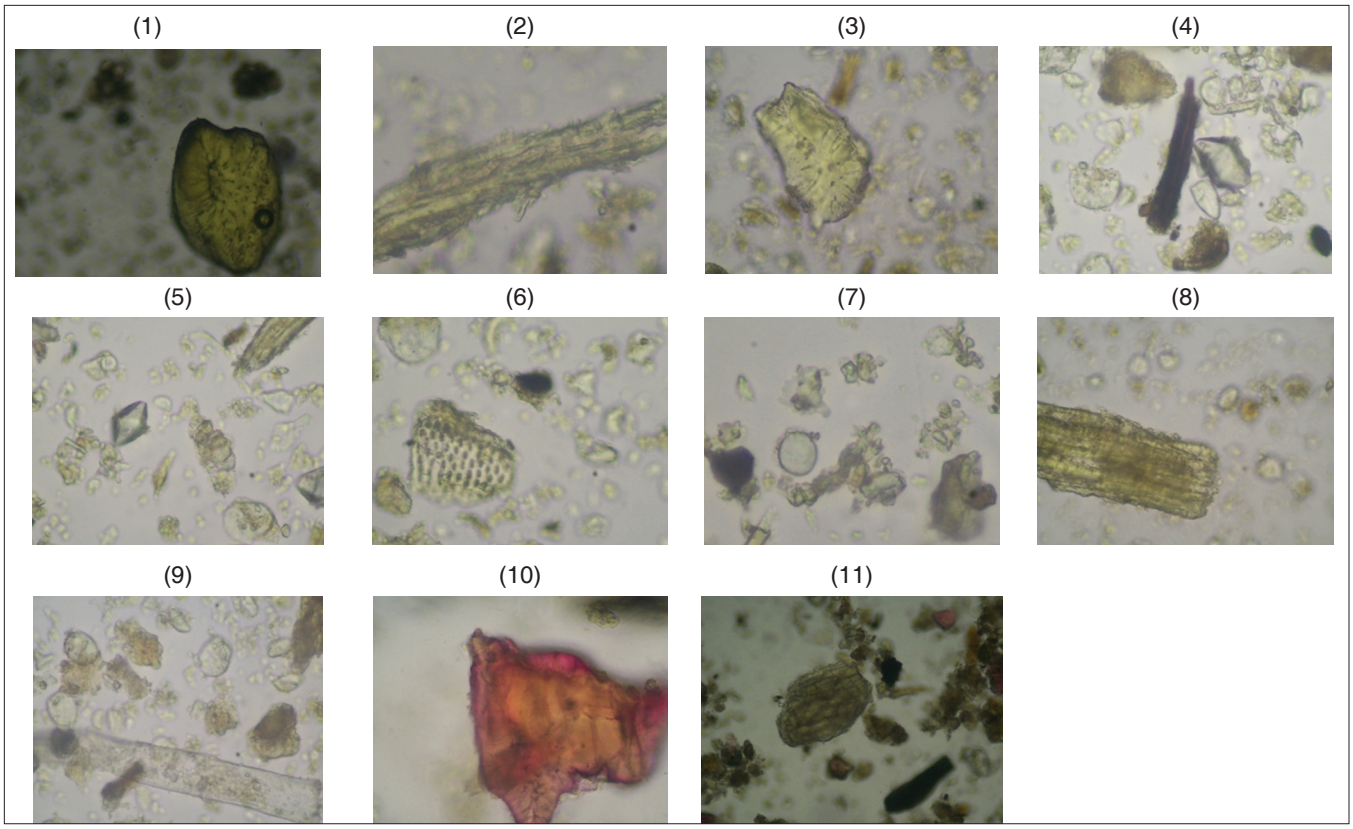

Plate 2: Microphotographs of *Shwasahara Dashemani Churna* with one *Bhavana* (Group B). (1) Squashed stone cells of *Pushkarmoola*. (2) Scrapped walls of fibers of *Jivanti*. (3) Stone cells of *Jivanti* (walls are ruptured). (4) Rhomboidal crystals of *Jivanti*. (5) Prismatic crystals of *Agaru*. (6) Fragment of border pitted vessels (walls ruptured) of *Jivanti*. (7) Oil globule of *Ela*. (8) Scleroids (walls are crushed) of *Agaru*. (9) Fibers of *Amlavetasa* (walls are smoothen). (10) Lignified stone cells (walls crushed) of Pushkaramoola. (11) Disturbed perisperm cells of *Ela*

Table 2: Organolaptic characters of both the drugs

Physical appearance	Group A	Group B
Color	Light brown	Dark brown
Odor	Slightly aromatic	Slightly aromatic
Taste	Pungent, ends with bitter	Astringent, ends with bitter
Touch	Fine	Fine (smooth)

bioavailability of the drug. Thus, levigation process might potentiate the medicine, and therefore, reduces the required dose and enhance the efficacy [Plate 2 - l-11].

Pharmaceutical Analysis

The higher value of loss on drying indicates more moisture content in Group A which may reduce the shelf life of the drug, whereas in Group B, the lesser value of loss on drying suggests the reduced moisture holding capacity which may increase the shelf life of the drug. Observations of water soluble and alcohol soluble extract of both group drugs show that the load of total polar and nonpolar extractive components are decreased in Group B (with seven *Bhavana)* than in Group A (with one *Bhavana*) which may be due to levigation process. This higher ash value in the seven *Bhavana Churna* suggests the increase in inorganic component of the drug also there is no role of increased number of *Bhavana* in changing the pH of drug. As the fundamental drugs of both the combination are similar, pH was observed same for both groups. pH values of both the groups suggest the acidic nature of the drug. Observation on particle size difference of both group drugs suggests the increase in particle size might be due to coating through the prolonged levigation process in Group B [Table 3].

HPTLC Study

Increase in number of spots at long UV radiation indicating difference of UV light responding components mainly dine type systems showing unsaturation in compounds present in both A and B samples. The explanation behind this is seven times levigation process in Group B resulting in breakdown of the hard cellular wall and releases of individual intracellular moieties of the drugs which are responsible for the higher peaks in HPTLC. This HPTLC profile can also be used for standardization and fingerprinting of the *Shwasahara Dashemani* with one *Bhavana* and seven *Bhavana* in future references [Table 4].

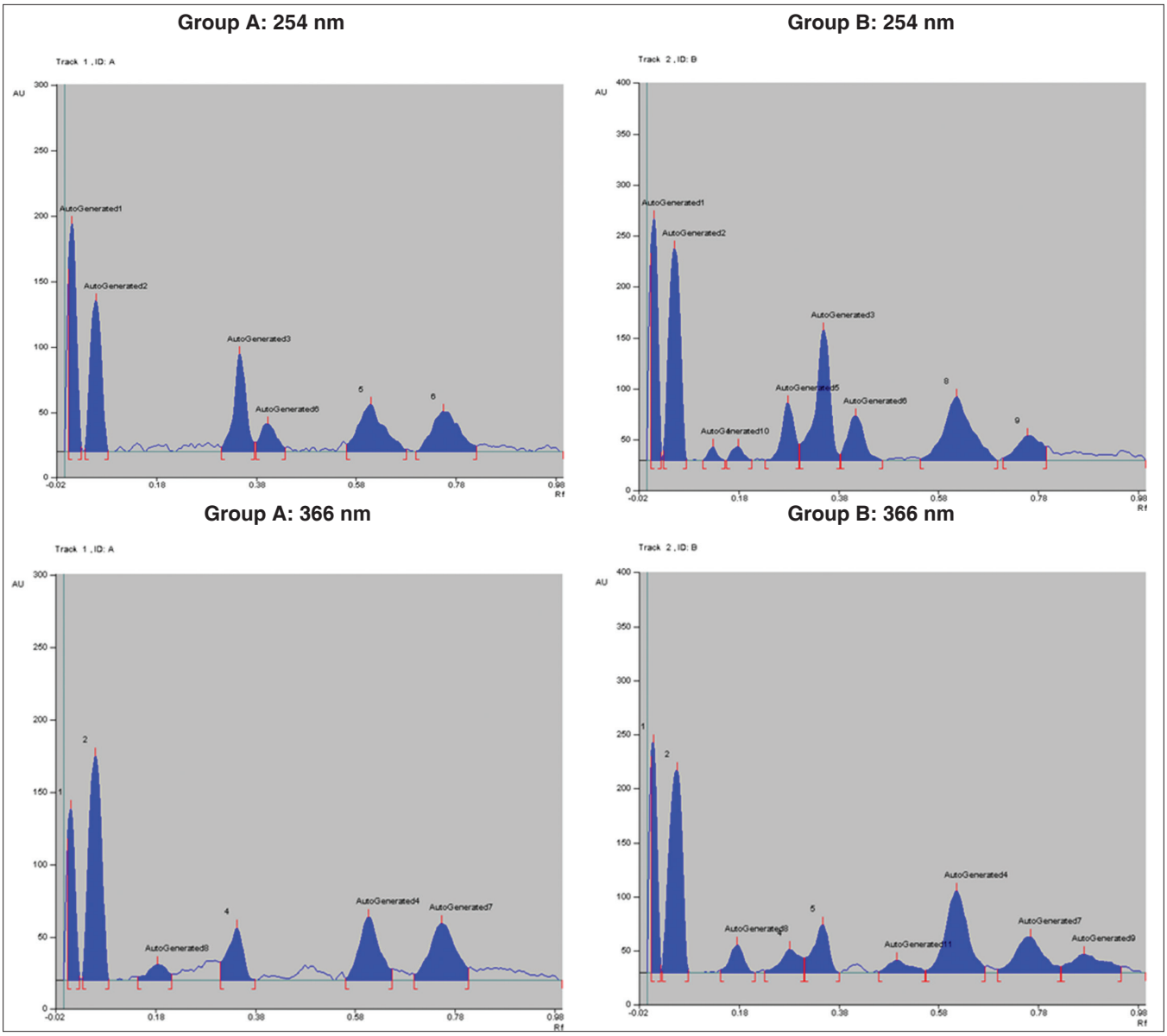

Plate 3: Densitogram of Group A and Group B

Table 3: Results of physicochemical analysis of both the samples

Test name	Group A results	Group B results
Loss on drying	7.9% w/w	3.3% w/w
Water soluble extracts	29.84% w/w	24.88% w/w
Methanol soluble extracts	17.92% w/w	12.72% w/w
Ash value	4.9% w/w	9.35% w/w
pH value	3	3
Particle size distribution		
Wt. of moderately coarse powder	34.55% w/w	71.23% w/w
Wt. of moderately fine powder	54.75% w/w	19.2% w/w
Wt. of fine powder	8.98% w/w	8.32% w/w
Wt. of very fine powder	1.49% w/w	1.20% w/w

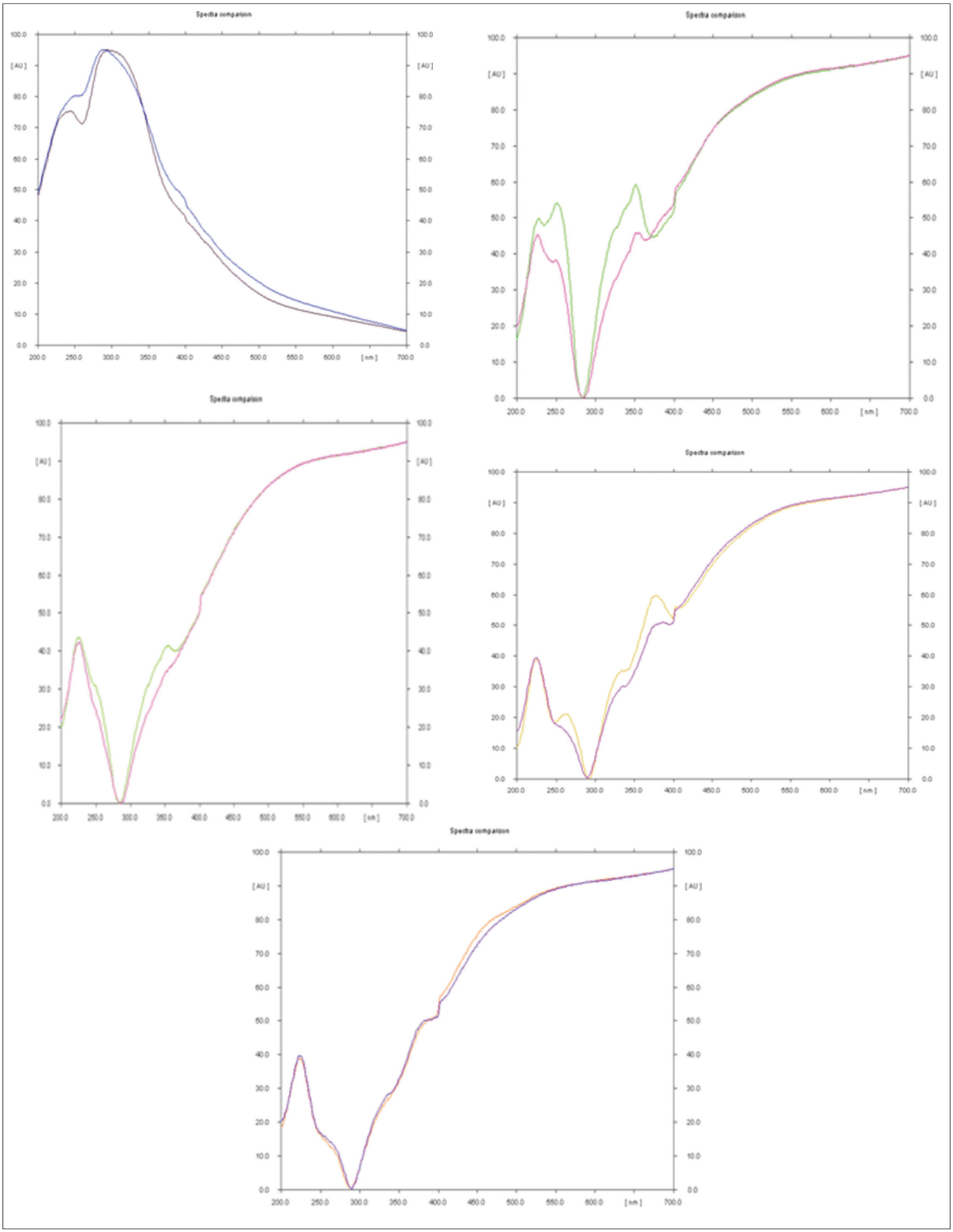

Plate 4: Spectral comparison of separated components on thin layer chromatography plate

Table 4: HPTLC study of *Shwasahara Dashemani Churna*

Under UV radiation				
Sample	**Short wave 254 nm**		**Long wave 366 nm**	
	Number of spots	**Rf**	**Number of spots**	**Rf**
Group A	6	0.01, 0.06, 0.35, 0.41, 0.61, 0.76	6	0.01, 0.06, 0.19, 0.35, 0.61, 0.76
Group B	9	0.01, 0.06, 0.13, 0.18, 0.28, 0.35, 0.42, 0.62, 0.76	9	0.01, 0.06, 0.18, 0.29, 0.35, 0.50, 0.62, 0.77, 0.88

HPTLC: High-performance thin layer chromatography, UV: Ultraviolet

CONCLUSION

Ayurveda *Bhavana Samskara* has great effect on changing the morphological cell structures of plants, pharmaceutical parameters such as water and alcohol soluble extracts, particle size, total ash values. Furthermore, there was change in HPTLC noted which suggest the role of *Bhavana* in altering the physicochemical parameters of same drugs with multiple application of *Bhavana*. These changes were evidence in present pharmacognostical and analytical studies. These all changes are very useful for better absorption and metabolism of drugs. In all, there are certain changes with the *Bhavana Samskara* in drugs which make it more potent in the form of drug metabolism. Therefore, *Bhavana Samskara* is very useful in disease conditions such as childhood asthma, to potentiate the drug with minimum dose.

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