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Research Article

PHYSICO-CHEMICAL ANALYSIS OF A HERBAL CLASSICAL FORMULATION- *SHLESHMATAKADHYA AGADA GHANAVATI*

Vanya Gupta[1]*, Ved Bhushan Sharma[2], R. C. Tiwari[3], Om Prakash Gupta[4]

*[1]P.G. Scholar, [2]Assistant Professor, [3]Professor & H.O.D, PG Dept. of Agadtantra, Uttarakhand Ayurveda University, Rishikul Campus, Haridwar, Uttarakhand.
[4]Professor, Dept. of Kayachikitsa, Sri Sai Ayurved Medical College, Aligarh, U.P, India.

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ABSTRACT

One of India's ancient systems of medicine is Ayurveda. The fundamental principal of Ayurvedic medicine is to keep your body, mind, and environment in balance and harmony in order to prevent and treat sickness rather than to treat symptoms of disease. In order to treat the disease's underlying cause and restore balance, Ayurveda uses natural ingredients. For a very long period, herbal medicines were used for a variety of therapeutic goals in ancient Chinese, Greek, Egyptian, and Indian medicine. According to the World Health Organization, 80% of the world's population still primarily relies on traditional medicines for their medical care. With around 45,000 plant species, the Indian subcontinent is renowned for being one of the key hubs for biodiversity. *Sharangdhara Samhita*, emphasised the idea of polyherbalism as a means of enhancing therapeutic efficacy. Sometimes the active phytochemical components of a single plant are not enough to bring about the intended therapeutic results so they are mixed in a certain ratio to enhance the therapeutic effects and combat toxicity. Hence new findings in Ayurveda are gradually focusing on the significance of poly herbalism and its clinical relevance. In this study, efforts have been made to lay down analytical standards for *Shleshmatakadhya Agada Ghanavati*, which were not found reported till date. *Shleshmatakadhya Agada Ghanavati* was manufactured at the Hans Herbal Pvt. Ltd. Pharmacy, Haridwar were within acceptable range. Determination of heavy metals was also done additionally and the result showed that all the metals were within the API limits in the formulation. In TLC, 3 spots were found.

INTRODUCTION

Ayurveda is one of the traditional medical systems with a long history that spans many centuries. One of the oldest therapeutic sciences, this ancient Vedic knowledge, also known as Ayurvedic Medicine, has survived to the present day thanks to many centuries of tradition. Ayurveda, also known as the "Mother of All Healing," has its roots in India and dates back thousands of years.

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Concept of Ayurveda is very clear that there is nothing in this nature which cannot be used as medicine 'जगत्येवमनौषधं' as everything in cosmos is created out of the conglomeration of five elements i.e., ether, air, fire. water, and earth including the body Accordingly medicines are derived from almost all natural sources of raw materials viz., plants, minerals, metals, animals and marine products after their suitable processing for efficacy, safety and palatability. Plant materials are processed in five basic process called *Panchvidh kashaya kalpana* they are *Swrasa, Kalka, Kwatha, Phanta* and *Hima.*[1] If a plant material is not processed through these processes, it cannot be transformed into a medicine. Some formulations need to go through one of the processes or several, depending on the situation. For any herbal (plant) substance, these procedures are therefore referred to as the fundamental procedures.

Ayurveda's core principles include avoiding unnecessary pain and leading a long, healthy life. Ayurveda employs natural methods such as diet, herbs, spices, minerals, exercise, meditation, yoga, mental hygiene, sounds, smells, and mechano-procedures to eliminate the root cause of the disease by restoring balance and to create a healthy lifestyle to prevent the reoccurrence of imbalance. This is in contrast to allopathic medicine, which uses synthetic chemicals designed for specific target receptors and primarily provides symptomatic relief. In order to avoid sickness and to advance wellbeing, longevity, energy, and happiness, Ayurveda is said to be holistic since it attempts to integrate and balance the body, mind, and spirit.

Due to their wider safety margins and cost-effectiveness, herbal medications are in increasing demand for primary healthcare worldwide. There are many issues with quality control of herbal medicines. The choice of the appropriate plant material that contains therapeutically effective chemicals is therefore the first and foremost responsibility. Herbal medications are produced on a large scale, but the manufacturers encounter numerous challenges, including the use of low-quality raw materials, a lack of raw material authentication, the absence of standards, improper standardisation methodologies for individual medications and formulations, and a lack of quality control standards.

Bhaishajya Kalpana or the pharmaceutical division as described in Ayurveda, deals with the many kinds of medicinal medicines, their formulations, dose, etc. *Bhaishajya Kalpana* is made up of from two words "drug" and "processing," respectively. *Samskarana* is the term for the process that a drug undergoes to bring about a change in its qualities or attributes, either by introducing a new characteristic or enhancing an already present one, ultimately making the drug safer and more potent.

In Ayurvedic classics, *Ghanavati* is categorized under *Rasakriya,* it is also considered as *Phanita* and *Avaleha*, because their method of preparation is almost same. These dosage forms are prepared by evaporating the water content of aqueous solutions [*Swarasa, Kwatha, Hima* and *Phanta*] and then made into *Vati* or powder if necessary.

Vati kalpana is one of the widely known crucial secondary Ayurvedic pharmaceutical preparations. This solid dose form is widely produced in the modern and Ayurvedic pharmaceutical industries. It is a truth that the effectiveness of a treatment mostly depends on the calibre of the pharmaceuticals used, which is why drug research is prioritised in medical research. Similarly in Ayurveda pharmacy also several *Acharyas* has been added or modified the different formulations or preparations according to their own experiences from time to time without violating the basic principles, to find out the most potent drug to prepared different formulations of herbal, herbo-mineral compounds in various form. To keep the medicine potent for long time, to prepared the medicine for easy administration and also quick action is taken into consideration. In the Ayurvedic field of practice through several types of *Kalpanas* are being used presently, *Vati kalpana* plays an important role in pharmaceutics of Ayurveda.[2]

Advantages of *Vati Kalpana*[3]

- *Vati* preparation is easy dosage controlled.
- The compacted form and convenient shape of *Vati* preparations make them easy to consume.
- The drug's unpleasant odour and bitter taste can be concealed.
- Volatile drug principles can be stored for a long time.
- They are more affordable as compared to other dose types.
- *Vati* is palpable in comparison to other dose forms of medication.

In the current study, an effort was made to prepare *Shleshmatakdhya Agada* as *Ghanavati* to assure process validation and to assess and compare the formulation with the available physico-chemical parameters.

"श्लेष्मातकत्वकक्षवकं गुडूची नृपद्रुमत्वगबृहतीद्वयं च ।
एशोऽगद: सर्वविषाणि हन्यादास्तीकनाम्ना मुनिना प्रदिष्टा: ।।"[4]
(यो.र.उ.विषचिकित्सा-३|पृष्ठ सं.४७७)

Shleshmatakdhya Agada is described as a classical preparation mentioned in *Yogaratnakara* in *Vishachikitsa* chapter*,* having ingredients that are said to work as *"Sarvavisha-nashanam"* i.e., on toxins or *visha* produced in Liver causing NAFLD*/Aamvishjanya Yakrit roga*. It was prepared following the standard operating procedures in GMP certified pharmacy. Since the therapeutic values and efficacy of the formulation depend on the several aspects, the present study has taken up for pharmaceutical analysis. The following parameters were used in the analysis of the *Ghanavati:* qualitative, TLC, and organoleptic (appearance, colour, odour, and taste) parameters as well as physiochemical (loss on drying, total ash, acid insoluble ash, water soluble extract, alcohol soluble extract, pH, uniformity of weight, friability, hardness, and disintegration time) parameters.

AIMS AND OBJECTIVES

- Identification and authentication of raw drugs used for *Shleshmatakdhya Agada Ghanavati.*
- Preparation of *Shleshmatakdhya Agada Ghanavati* at GMP certified pharmacy.
- Organoleptic, Physicochemical and TLC analysis of *Shleshmatakdhya Agada Ghanavati.*

MATERIALS AND METHODS

Collection Plant Material

1. ***Shleshmatak*:** Bark of *Shleshmatak* was collected from Alaknanda Ghat, Haridwar, in May 2021. It was washed thoroughly with running water and dried in shade.
2. ***Apamarga*:** *Apamarga* whole plant was collected from Nepali Farms, Haridwar and from Rishikul campus, Haridwar, in the months between July-August 2021. It was washed thoroughly with running water and dried in shade.
3. ***Amaltas*:** *Amaltas phala* (fruit pod) was collected from Rishikul campus, Haridwar, in the month of July 2021.It was washed thoroughly with running water and dried in shade.
4. ***Guduchi:*** *Guduchi kanda* (stem) was collected from Rishikul campus, Haridwar, in the month of July 2021. It was washed thoroughly with running water and dried in shade.
5. ***Kantkari:*** *Kantakari* whole plant was collected from Nepali Farms, Haridwar, in the months between July-August 2021. It was washed thoroughly with running water and dried in shade.
6. ***Brihati:*** *Brihati* whole plant was collected from Nepali Farms, Haridwar, in the months between July-August 2021. It was washed thoroughly with running water and dried in shade.

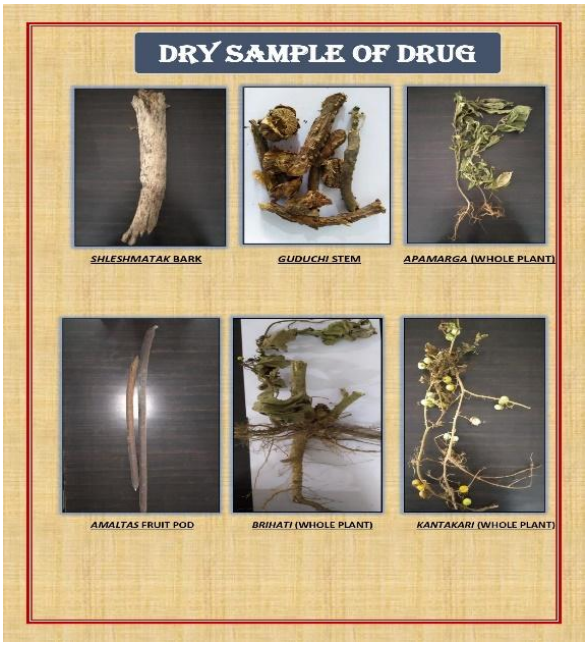
The entire dried samples were stored in a sack. The ingredients etc. are mentioned in table 1.

Table 1: Showing Ingredients, Parts used and Quantity of *Shleshmatakdhya Agada Ghanavati*

S.No.	Drug	Family	*Gana*	Parts used	Quantity
1.	***Shleshmatak*** *(Cordia dichotoma* Forst.)	Boraginaceae	*Vishghna (Ch.) Phalavarga (Su.)*	Bark	1 part (6kg)
2.	***Apamarga*** *Achyranthes aspera* L.	Amaranthaceae	*Shiro-Virechana, Krimighna, Vamanopaga (Ch.) Arkadi (Su.)*	Whole plant	1 part (6kg)
3.	***Guduchi*** *(Tinospora cordifolia* Wall.ex Seringe*)*	Menispermaceae	*Vayasthapana, Daha prahsmana, Triptighana, Trishna nighrana, Stanyashodhana (Ch.) Patoladi, Guduchyadi, Vallipanchamoola, Aragvadhadi, Kakolyadi (Su.)*	Stem	1 part (6kg)
4.	***Amaltas*** *(Cassia fistula* Linn.)	Fabaceae	*Virechana, Kushthagana, Kandughana (Ch.), Aragvadhadi, Syamadi, Slesma Samsamana, Adhobhagahara (Su.)*	Fruit Pod	1 part (6kg)
5.	***Kantkari*** *(Solanum surattense* Burm. F.)	Solanaceae	*Kasahara, Shothahara, Hikkanigrahana, Angamarda prashamana (Ch.) Brihatyadi, Varunadi, Laghupanchamoola (Su.)*	Whole plant	1 part (6 kg)
6.	***Brihati*** *(Solanum torvum* Sw.)	Solanaceae	*Kanthya, Hikka nigrahana, Shothahara, Angamarda prashnama (Ch.) Brihatyadi, Laghupanchamoola (Su.)*	Whole plant	1 part (6 kg)

Identification and Authentication of Raw Drugs and their Dry Samples

Raw drugs/dry sample identification and authentication was done by eminent experts of P.G Department of Dravya Guna, Rishikul Campus, Haridwar (Picture 1).



Picture 1: Dry Sample of Drug

Pharmaceutical Study

The whole process of *Shleshmatakadhya Agada Ghanavati* preparation was done at Hans Herbal pvt. Ltd., Haridwar. It is divided into two parts:

1. Preparation of *Shleshmatakadhya Agada Kwatha*
2. Preparation of *Ghanavatis*

1. Preparation of *Shleshmatakadhya Agada Kwatha*

Reference: *Sha.S.M.Kh*. 9/2-3

Equipments used: Grinder, stainless steel container, gas stove, big spatula, cloth,

Principle used: Boiling

- All the dried sample were taken together and grinded by the grinder to form a *Yavakuta churna*.
- *Yavakuta churna* of dried *Shleshmatakadhya Agada* (30.8kg) was taken in a big vessel and kept soaked in 320 lit. of water (as per principle, 16 *Guna jala* for *Kathin dravyas*) overnight.
- The next morning, *Kwatha* material was heated on a medium flame with continuous stirring without covering the lid to avoid *Guruta* in *Kwatha* and possibilities of settling down of the contents.
- The process was continued until *Kwatha* reduced up to the quantity of 1/16th part. Then the prepared *Kwatha* was filtered through a four-fold cotton cloth.
- Filtered *Kwatha* was then collected in a big-vessel for further procedure. The taste of the *Kwatha* becomes bitter at the end and had the characteristic smell.

2. Preparation of *Shleshmatakadhya Agada Ghanavati*

Reference: *Sha S/Ma.Kh*. 8/1

Equipments used: Stainless steel container, gas stove, big spatula, thermometer, hot air oven, steel tray.

Principle: *Toyagni Sannikarsha* or Open Pan Boiling

Procedure

- Previously prepared *Kwatha* was taken into a steel vessel and we started heating it again (*Punaha-Paka*) with continuous stirring on mild heat maintaining the temperature between 90°C and 95°C, to avoid burning of material.
- The process was continued until the moisture evaporated till a semisolid consistency is obtained.
- As the water evaporates, the viscosity of the extract increases, resulting in *Ghana* form. Quantity obtained was 3.25kg.
- It was then collected in a tray and placed in Hot Air Oven at not exceeding 50°C to 60°C for drying for 10 to 12 h.
- The formulation was then compressed in a single-punch press with a target weight of 500mg in *Vati* maker machine for 3 hours. *Ghanavatis* were hence prepared.
- *Ghanavatis* were then packed, sealed and labelled in air-tight condition in small containers to protect them from light and moisture.

Methods of evaluation of *Shleshmatakadhya Agada Ghanavati*

The analysis of *Shleshmatakadhya Agada Ghanavati* was conducted using conventional qualitative and quantitative criteria. At the GMP-certified Multani Pharmaceuticals Limited, Haridwar, all procedures were carried out.

Physico-Chemical Analysis

It includes parameters like colour, taste, etc; pH, loss on drying, total ash, acid insoluble ash, alcohol soluble extractive, water soluble extractive, uniformity of weight, disintegration time, hardness and heavy metal presence.

Chromatography

While evaluating the quality of compound herbal medicines might be challenging, it is rather easy for preparations that use one or a few plant medications as their primary raw materials. By employing the "Thin layer Chromatography" technology and known chemical ingredients as reference standards (markers), it is possible to evaluate the quality of these medications. The knowledge of the essential chemical constituents is a medicinal plant and detection of their presence in a preparation can be readily established by TLC. TLC can even provide a semi-quantitative analysis of the preparation's chemical components. It is a truly effective tool for standardising a medicine and more important than simple assessment of ash content, measurement of specific gravity, etc., which may comply with the recommended values even if a key medicinal plant is missing in a preparation. While more advanced techniques (H.P.L.C., GLC, etc.) have undoubtedly been created, TLC is a relatively simple, practical, easy, quick, convenient, efficient, and affordable approach for quick assessment of the quality of the majority of herbal preparations.

OBSERVATIONS AND RESULTS

Pharmaceutical analysis/Analytical study is mainly focussed on drug analyses, in raw materials and pharmaceutical formulations, involving the determination of active components, impurities, excipients, content uniformity, solubility, dissolution rate and stability.[5] The formulation *Shleshmatakadhya Agada Ghanavati* was prepared following standard operating procedures in GMP certified pharmacy and was subjected for qualitative and TLC analysis. The pharmaceutical analysis results were observed are as below:

Organoleptic Assessment

The fundamental criterion for choosing raw materials and ensuring the quality of the final formulation are the organoleptic characteristics. The characteristics observed were: (Table 2)

Table 2: Organoleptic Characteristics of *Shleshmatakadhya Agada Ghanavati*

S. No.	Parameters	Observation
1.	Appearance	A Black coloured round shaped uncoated tablet
2.	Colour	Black
3.	Touch	Hard
4.	Taste	Bitter
5.	Smell	Pleasant

Physico-Chemical Analysis of *Shleshmatakadhya Agada Ghanavati* (Table 3 and Table 4)

1. **Uniformity of weight:** Tablet weight is mainly affected by factors such as tooling of the compression machine, head pressure, machine speed and flow properties of the powder. Inconsistent powder or granulate density and particle size distribution are common sources of weight variation during compression. Uniformity of weight is an in-process test parameter which ensures consistency of dosage units during compression.[6]
2. **Disintegration Time:** This test determines whether dosage forms such as tablets, capsules, boluses pessaries and suppositories disintegrate within a prescribed time (disintegration time) when placed in a liquid medium under the prescribed experimental conditions. For the purpose of this test, disintegration does not imply complete solution of the dosage unit or even of its active constituent. Disintegration is defined as that state in which no residue of the unit under test remains on the screen of the apparatus or, if a residue remains, it consists of fragments of disintegrated parts of tablets component parts such as insoluble coating of the tablets or of capsule shells, or of any melted fatty substance from the pessary or suppository or is a soft mass with no palpable core.[7]
3. **Hardness*:*** Tablet hardness testing, is a laboratory technique used by the pharmaceutical industry to determine the breaking point and structural integrity of a tablet and find out how it changes "under conditions of storage, transportation, packaging and handling before usage".
4. **Loss on Drying:** Loss on drying is the loss of weight expressed as percentage w/w resulting from water and volatile matter of any kind that can be driven off under specified conditions. The test is carried out on a well-mixed sample of the substance. If the substance is in the form of large crystals, the size is reduced by rapid crushing to a powder. Also, here the drying temperature is indicated by a single

value other than a range, drying is carried out at the prescribed temperature + 2º.[8]

5. **Ash value:** Ash values are helpful in determining the quality and purity of crude drugs, especially in powder form. The objective of ashing vegetable drugs is to remove all traces of organic matter, which may otherwise interfere in an analytical determination. On incineration, crude drugs normally leave an ash usually consisting of carbonates, phosphates and silicates of sodium, potassium, calcium and magnesium[9]. Total ash content reveals how many minerals are physiologically contained in the medicinal plants and how many foreign materials have been mixed in during the course of processing or the handling done during its preparation.
6. **Acid insoluble Ash:** Acid-insoluble ash content shows how many fine soil and sand particles are present. Acid-insoluble ash (AIA) is used as a marker in digestibility studies. Three variations of the original gravimetrically method, based on burning of organic matter in the sample by ashing, boiling in hydrochloric acid, and re-ashing, are commonly used to determine AIA contents.[10]
7. **Water Soluble extractive value:** Water-soluble extractive value plays a vital role in evaluation of crude drugs. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing during drying or storage or formulating.
8. **Methanol soluble extractive value:** The alcohol-soluble extractive value was also indicative for the same purpose as the water-soluble extractive value. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing during drying, or storage or formulating.[11]
9. **pH:** The pH of the drug delivery system influences the route of penetration of the drug, making it important to know the major pathways of drug penetration. Increase in pH leads to decrease in solubility and percentage of unionized form of weakly basic drug and an increase in its distribution coefficient.[12]
10. **Heavy Metals like As, Cd, Hg, Pb:** For the safety of the patient, maximum acceptable metal residues arising from the use of metals as catalysts or reagents in the synthesis of drug substances and excipients is recommended. Since there is no therapeutic benefit from residual metals, specification acceptance criteria should be applied to those metals present in these pharmaceutical substances in a manner that is consistent with safety- and quality-based criteria.[13]

Chromatography (TLC): Thin layer chromatographic technique is used to understand the presence and variation of four important secondary metabolites namely, steroids, terpenoids, flavonoids and alkaloids in the Ayurvedic preparation. Among various analytical techniques, thin-layer chromatography (TLC) is ideal for this task due to their short time analysis, ease of operation and low cost.

Table 3: Physico-Chemical Analysis of *Shleshmatakadhya Agada Ghanavati*

S.No.	Test Parameters	Results	Method Reference
1.	Uniformity of weight (%)	Within limits	API
2.	Disintegration Time (mins)	28-29	API
3.	Hardness (Kg/cm^2)	2.5	API
4.	Loss on Drying (%w/w)	5.26	API
5.	Ash value (w/w)	23.55	API
6.	Acid insoluble ash (w/w)	3.21	API
7.	Water soluble extractive value (%w/w)	74.14	API
8.	Methanol soluble extractive value (w/w)	13.51	API
9.	pH (5% aqueous solution)	4.84	API
10.	Heavy Metals		
	a) Lead as Pb (ppm)	1.92	API-II/III, Appendix 2.3.7
	b) Cadmium as Cd (ppm)	0.75	API-II/III, Appendix 2.3.7
	c) Arsenic as As (ppm)	0.15	API-II/III, Appendix 2.3.7
	d)Mercury as Hg (ppm)	0.85	API-II/III, Appendix 2.3.7

Table 4: Showing Analysis by TLC of *Shleshmatakadhya Agada Ghanavati*

S.No.	No. of Spots	Rf Value
1.	1	0.588
2.	1	0.470
3.	1	0.412

DISCUSSION

The need of quality control for Ayurvedic drug is due to the fact that the preparation of drug according to the ancient processes has been reduced due to the commercialization of Ayurvedic pharmacy during past era. The main aim of the analysis is to check the quality of the prepared formulation for obtaining desired therapeutic effect. So, it is necessary to control batch to batch variation, which is possible only through standardization protocols.

While drying the components of the formulation sample that was taken, it was seen that about 20% of the moisture content was lost. The percentage loss in total mixture, was observed during the preparation of *Shleshmatakadhya Agada Kwatha Churna* due to manual errors such scattering during crushing. According to the instructions in the *Sharagadhar Samhita*, sixteen times as much water was added to the material that had been sieved into a coarse powder, soaked overnight, and then reduced to an eighth of its original volume the following day to create *Shleshmatakadhya Agada Kwatha*. The *Kwatha* preparation process was conducted at a medium flame for a longer period of time. Long-term constant temperature increases a compound's solubility in a solvent, and to some extent, make it easier for the solvent to reach the target organism's cellular structure for extraction.

The basic goal of the *Ghana* preparation is to separate the therapeutically active ingredient from the parent medicine without destroying any beneficial active ingredients. *Ghana* has the highest concentration of the active ingredients. Because of this, the formulation is preferable to *Kwatha* form. *Shleshmatakadhya Agada Ghana's* average yield was 3.25 kg. Loss may have occurred as a result of clinging to the equipment during collection as well as to the hand gloves. Ghana was punched into 500mg (approximately) tablets and finally *Shleshmatakadhya Agada Ghanavati* was obtained.

Organoleptic Characteristics

Organoleptic characteristics are the fundamental criterion for choosing raw materials and ensuring the quality of the final formulation. The final formulation's smooth texture was determined to indicate surface homogeneity free of fractures. Due to the unique qualities of the components utilised, the tablet was black in colour, had a bitter flavour, and had a distinctive, pleasant odour.

Physico-Chemical Parameters

pH Value of Drug

The rate and extent of oral drug absorption is ascertained by a complex interaction between a drug's physicochemical properties, GI physiologic factors, and the nature of the formulation administered. It is known that mucosal lining of GIT is impermeable to the ionized form of weak acids or bases. Most of the drugs are available as weak acids or weak bases.

The weak base is absorbed at a faster rate from the intestine (pH 7.50–8), this is because the basic substances can't be ionized in basic medium. So, the uncharged substances can be passed without difficulty due to its lipid solubility. Similarly, weak acid is absorbed at a faster rate from stomach (pH 1.4–2). Here pH of the *Shleshmatakadhya Agada Ghanavati* is 4.84 hence more soluble in the Gastrointestinal tract.

Loss on Drying

Loss on drying is a commonly used test method to determine the moisture content of a sample, although occasionally it may refer to the loss of any volatile matter from the sample. Loss on drying does not generally refer to molecularly bound water or water of crystallisation. Loss on drying (LOD) is determined by heating the sample below its melting point and it includes all volatile matter including water content and solvents. If relative humidity is too low, the lack of tablet cohesion will lead to lamination or friability. On the contrary, if moisture content is too high, granules will stick to the surface of the punch press. Also, if there is any excess moisture content in the formulation it will lead to microbial growth and lead to deterioration of the medicine in its quality and efficacy. Here 5.26 (%w/w) is the loss on drying which is within the API values and hence no pharmaceutical degradation of medicinal qualities of *Shleshmatakadhya Agada Ghanavati*.

Total Ash and Acid Insoluble Ash Values

The moisture of herbal medicines impacts quality deterioration due to toxigenic fungi and damage from insects if crude drugs are poorly dried and stored. The content of total ash displays how many minerals are physiologically contained in the medicinal plants and how many foreign materials are mixed

during the course of processing. The acid-insoluble ash content shows how many fine particles of soil and sand are present, which has an association with dangerous heavy metals. The total Ash value (w/w) is 23.55 while Acid insoluble ash (w/w) is 3.21 which is within API limits which gives an estimation about purity and quality of our drug.

Water-soluble extractives and Alcohol-soluble Extractives

Extractive values are mainly useful for the determination of exhausted or adulterated drugs. The extractive value of the crude drug determines the quality as well as purity of the drug through alcohol and water-soluble extractive values. The water-soluble extractives content is the proportion of the biomass that is lost as a result of extraction with water. The value plays an important role in evaluation of drugs. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing during drying or storage or formulating.

Alcohol extractive content is considered to be the total mass proportion of the biomass that is lost as a result of extraction with 95% methanol. It is also indicative for the same purpose as the water-soluble extractive value. Less extractive value indicates addition of exhausted material, adulteration or incorrect processing during drying, or storage or formulating.

Water extractive value (%w/w) is 74.14 and methanol soluble extractive value (w/w) of *Shleshmatakadhya Agada Ghanavati* is 13.51 which is within API limits and employed as standard reference for quality control analysis of the formulation.

Uniformity of Weight

Drug distribution and quantity control are made easier with its aid. The average weight of the current sample of *Shleshmatakadhya Agada Ghanavati* was within API limits, which indicates the consistency of the weight in comparison to the planned weight of each *Ghanavati*, which is 500mg.

Thin Layer Chromatography (TLC) Analysis

The knowledge of the essential Chemical constituents is a medicinal plant and detection of their presence in a preparation can be readily determined by TLC. Even a semi-quantitative evaluation of the Chemical constituents of the preparation is possible by TLC. No doubt, more sophisticated and technologically advanced techniques (H.P.L.C, GLC, Etc) have been developed but TLC is relatively simple, handy, easier, quick, convenient, efficient and inexpensive method for quick assessment of the quality of most of the herbal preparations. The Rf value is the retention factor used in the identification of organic compounds in a mixture. The Rf can provide corroborative evidence as to the identity of a compound. On TLC analysis of *Shleshmatakadhya Agada Ghanavati* 3 spots and 3 Rf values were determined viz., 0.588, 0.470, 0.412 of the 6 contents of the *Agada*. This may be due to the possibility that if two substances have the same Rf value, they are likely (but not necessarily) the same compound and if they have different Rf values, they are definitely different compounds. Rf is not a very precise parameter as published data on a substance may or may not be distorted by some factors like the absorbent, the solvent, the chromatography plate itself, application technique and the temperature of the solvent and plate.

CONCLUSION

The Ayurvedic system of therapy is getting popular amongst the people for a variety of health problems, notably lifestyle disorders. The ingredients of *Shleshmatakadhya Agada* were recognised, validated, and employed for preparation using pharmacognostic methods. Prior to use, every plant or medication must undergo a thorough investigation because the therapeutic efficiency of a medication depends on the calibre of the ingredients employed in its preparation. The manufactured medication, *Shleshmatakadhya Agada Ghanavati,* was pharmacologically examined for physicochemical analysis, and TLC. *Shleshmatakadhya Agada Ghanavati* is a herbal preparation that contains *Shleshmatak Twaka, Apamarga Panchanga, Guduchi Kanda, Amalatas Phala, Kantakari Panchanga and Brihati Panchanga* as components. It is a classical formulation mentioned in *Yogaratnakara* as "*Sarva vishani*" meaning can be used to eliminate any kind of toxins from the body. In this study, *Shleshmatakadhya Agada Ghanavati* was made at a pharmacy that was GMP certified, in compliance with the traditional references, and using standard operating methods. Before being used for preparation, raw medicines were recognised and verified.

Pharmacological tests on the medication included TLC, qualitative, and physicochemical analyses. The most significant, most popular, and most effective dosage form is *Kashaya kalpana.* However, it has some drawbacks, including the difficulty of ensuring the quality control of the herbal ingredients, the time and inconvenience required for preparation, transportation, and storage, and the difficulty of prescribing an accurate dose. These barriers weaken compliance and could obstruct treatment. Globalization has made it necessary to develop its dosage formulations. In light of the aforementioned issues, the researcher made an effort to create a new dosage form for the formulation and evaluate it using several analytical metrics. Preliminarily, it can be deduced that the formulation satisfies the minimum

qualitative requirements listed in the API. This study is an attempt to lay the foundational prerequisites for the standardisation of *Shleshmatakadhya Agada Ghanavati*. The results of this study will help to standardise *Shleshmatakadhya Agada Ghanavati* in the future and prepare the manuscript for Ayurvedic Formula of India (AFI).

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***Address for correspondence**
Dr. Vanya Gupta
P.G. Scholar,
Dept. of Agad Tantra,
Uttarakhand Ayurveda University,
Rishikul Campus, Haridwar,
Uttarakhand, India.
Email: vanya.gupta186@gmail.com
Phone no: 9532992535