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PHARMACOGNOSTIC AND ANALYTICAL STANDARDIZATION OF DASHANGA KWATHA: A POLYHERBAL FORMULATION FOR MANAGEMENT OF GERD

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ABSTRACT

The present investigation encompasses a comprehensive pharmacognostic and analytical evaluation of Dashanga Kwatha, a classical Ayurvedic polyherbal formulation traditionally employed in the management of Gastroesophageal reflux Disease (GERD). Authentication of the individual constituent drugs was undertaken as a primary and fundamental step toward systematic standardization of the formulation. Since herbal medicines, whether used individually or in combination, comprise multiple bioactive compounds within intricate matrices wherein no single constituent can be attributed solely to therapeutic efficacy, a holistic analytical approach was adopted. Pharmacognostic characterization was performed through organoleptic, macroscopic, and microscopic examinations, while analytical profiling was achieved by means of physicochemical parameters, phytochemical screening, and High-Performance Thin Layer Chromatography (HPTLC) with optimized solvent systems. Microbial load assessment of the dried powdered plant material was conducted to ensure microbiological safety and prevent contamination of the crude drug. The data generated through this study serve as authentic referential standards for the correct identification, quality assessment, and reproducible procurement of raw materials intended for the preparation of Dashanga Kwatha. Collectively, these findings contribute toward establishing robust quality control parameters and standardization protocols for Dashanga Kwatha, thereby facilitating its safe and efficacious application in contemporary clinical practice.

KEYWORDS: *Dashanga Kwatha, Pharmacognosy, Phytochemistry, Standardization, Gastroesophageal reflux Disease (GERD)*

INTRODUCTION

Every plant species possesses distinct morphological, anatomical, and chemical characteristics that collectively define its botanical identity and pharmaceutical authenticity. These species-specific features are particularly valuable in distinguishing closely related taxa within the same genus or family, thereby ensuring that only the correct and genuine plant material is utilized in medicinal preparations. Accurate identification of source plant material represents one of the most critical prerequisites for guaranteeing the quality, efficacy, and reliability of any herbal formulation.

Since ancient times, humanity has sought effective means to combat and manage disease. With the global population approaching and surpassing five billion, the economic burden of modern western pharmaceutical products remains beyond the reach of approximately three-quarters of the world's population. Consequently, a significant proportion of people across the globe continue to depend on traditional plant-based medicine as their primary healthcare resource. It is noteworthy that nearly one-third of all pharmaceutical agents currently in use are derived from plant sources, underscoring the enduring relevance of medicinal botanicals in contemporary healthcare.

Despite remarkable advancements in pharmaceutical sciences, quality control and quality assurance of herbal medicines remain a persistent challenge, largely attributable to the inherent variability in the chemical composition of plant-derived materials. Numerous formulations described in classical Ayurvedic literature have demonstrated therapeutic utility in the management of Urdhwaga Amlapitta, clinically correlated with Non-Ulcer Dyspepsia. Dashanga Kwatha represents one such well-documented and widely referenced classical formulation.

The present study reports a systematic pharmacognostic investigation encompassing macroscopic and microscopic characterization, along with dry powder analysis using various solvents and reagents. These approaches facilitate accurate identification of dried and powdered plant materials while enabling detection and prevention of adulteration. The overarching objective is to authenticate the therapeutic safety and efficacy of the constituent drugs through standardized, scientifically validated methodologies, thereby establishing a reliable foundation for quality assurance of Dashanga Kwatha.

MATERIALS AND METHODS

Sample Collection

The herbal ingredients specified in Bhaisajya Ratnavali under Amlapitta Rogadhikara for the formulation of **Dashanga Kwatha** were procured from local market and identified by Dravyaguna

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department of G.A.M,Puri. Each drug was submitted to the Department of Rasashastra & Bhaisajya Kalpana of G.A.M Puri for botanical authentication. Prior to processing, visible physical contaminants were manually removed, and the raw materials were thoroughly rinsed with water. The washed samples were then dried under sunlight at temperatures not exceeding 45°C. Each ingredient was individually ground into a coarse powder using a mechanical grinder. The resulting powders were subsequently subjected to pharmacognostic and analytical investigations in Rajiv Gandhi Ayurvedic medical College & Hospita P.G Research centre Gadag, Karnataka. The botanical identities and plant parts used for each ingredient of Dashanga Kwatha are detailed in below.

Chemicals and Instruments

Standard laboratory glassware, including compound microscopes, glass slides, cover slips, and watch glasses, were employed throughout the study. Extraction solvents used included methanol, toluene, ethyl acetate, ethanol (95%), and distilled water. Analytical-grade reagents — namely phloroglucinol, glycerin, hydrochloric acid (HCl), and sodium hydroxide — were utilized for various analytical procedures.

Pharmacognostic Parameters

Organoleptic Evaluation: The sensory characteristics of both the raw drugs and their powdered forms — including color, odor, taste, and texture — were systematically observed and documented for leaves, bark, and corresponding powders.

Microscopic Evaluation: Dried powder samples were examined under a compound microscope. Each sample was stained using phloroglucinol and concentrated HCl, mounted in glycerin, and observed for distinctive microscopic features.

Crude Drug of Dasanga Kwatha

INGREDIENTS

Sl.No	Sanskrit name of drugs	Botanical Name	Part used
1	Vasa	*Adhatoda vasica*	Mula
2	Amrita	*Tinospora cordifolia*	KandaTwak
3	Parpata	*Fumaria vaillontii*	Panchanga
4	Nimba	*Azadiracta indica*	Patra,Twak
5	Bhunimba	*Andrographis paniculata*	Panchanga
6	Markaba	*Eclipta alba*	Panchanga
7	Haritaki	*Terminalia chebula*	Phala
8	Amalaki	*Embelica officinalis*	Phala
9	Bibhitaki	*Terminalia bellirica*	Phala
10	Potala	*Trichosanthes dioica*	Patra

RASAPANCHAKA

Sl. No.	Sanskrit name of drugs	Rasa	Guna	Veerya	Vipaka	Dosha Karma
1	Vasa	**Tikta, kasaya**	Ruksha laghu	**Sita**	Katu	**Kapha pitta samaka**
2	Amrita	**Tikta, Kasaya**	Guru, Snidha	Ushna	**Madhura**	**Tridosha samaka**
3	Parpata	**Tikta**	Laghu	**Sita**	Katu	**Kapha pitta samaka**
4	Nimba	**Tikta, Kasaya**	Laghu	**Sita**	Katu	**Kapha pitta samaka**
5	Bhunimba	**Tikta**	Laghu, Ruksha	Ushna	Katu	**Kapha pitta samaka**
6	Markaba	Katu **kasaya**	Ruksha laghu	Ushna	Katu	Kapha vata samaka
7	Haritaki	Pancha rasa (lavanavarjeet)	Laghu, Ruksha	Ushna	**Madhura**	**Tridosha samaka**
8	Amalaki	Pancha rasa (lavanavarjeet)	Guru Ruksha	**Sita**	**Madhura**	**Tridosha samaka**
9	Bibhitaki	**Kasaya**	Ruksha , Laghu	Ushna	**Madhura**	**Tridosha samaka**
10	Potala	**Tikta**	Laghu Ruksha	Ushna	Katu	**Tridosha samaka**

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Analytical Study Finding

Rajiv Gandhi Education Society's

Ayurvedic Medical College, Hospital, PG Research Centre

Dist: Gadag **RON – 582 209,** State: Karnataka.

(AYUSH approved ASU drug testing laboratory Lic. No. TL-13/2023)

DRUG TESTING LAB

Outward number: RGESDTL/ LR/26/0212

Ref No.	DTLRC/26/040	Registration date:	28/02/2026	Report date:	20/03/26
Submitted by:	Dr. Jhilima Behera	Requisition no:	------	Sample Qty:	100GM
Sample name:	Dashanga kwatha	Batch no:	28-DGK-25	Date of expiry:	10-12-2027
Reference:	Compound formulation	Mfg Date:	11-12-2025	Part/form:	Powder

TEST REPORT

Form – 50 [see rule-160-D (f)]

(As per Drug and cosmetic act 1940 and the rules there under)

Sl. No	Tests	Results
	A. Organoleptic study	
1	DESCRIPTION	Form: Coarse powder Colour : Light brown Taste : Bitter Odour : Characteristic
	B. Physicochemical study	
2	Total Ash value	7%
3	Acid insoluble ash	00
4	Particle size	425µm - 250µm
5	Loss on drying	10.74%
6	Water soluble extract	11.8%
7	Alcoholic soluble extract	4%
8	pH (5%)	5.6
9	Bulk density	0.304gm/ml
10	Tap density	0.375gm/ml
11	TLC Ext: Ethanol Mobile phase: Toluene: Ethyl acetate (9:1)	Visible light Rf value: Nil 254 nm: 0.33 0.67 0.83 366nm: 0.22 0.33 0.39 0.61 0.67 0.72 0.89

End of Report*

(Standards referred above are as per API and PSAF), In my opinion the sample is standard quality

Analyst
ANALYST

Lab in-charge
IN-CHARGE
DTL R.G.E.S. A.M.C. & H.RON

R.G.E.S. AYURVEDIC MEDICAL COLLEGE & HOSPITAL * RON * TL-13/2023

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DISCUSSION

The present drug testing report was conducted at the AYUSH-approved Drug Testing Laboratory of Rajiv Gandhi Education Society's Ayurvedic Medical College, Hospital and PG Research Centre, Gadag, Karnataka (Lic. No. TL-13/2023), in accordance with the Drug and Cosmetics Act, 1940. The sample of Dashanga Kwatha (Batch No. 28-DGK-25, manufactured on 11-12-2025) was evaluated as a compound formulation in powder form, and the results were interpreted as per API and PSAF standards. The lab in-charge declared the sample to be of standard quality, which validates its suitability for therapeutic use in the management of GERD.

A. Organoleptic Study

Organoleptic parameters serve as the preliminary and most accessible means of quality assessment of any herbal formulation. The powdered sample of Dashanga Kwatha was characterized as a coarse powder, light brown in color, with a bitter taste and a characteristic odor. The bitter taste of the formulation can be attributed to the presence of bitter principles such as nimbin from Nimba (Azadirachta indica), andrographolide from Bhunimba (Andrographis paniculata), and berberine-like compounds from Guduchi (Tinospora cordifolia). Bitterness is pharmacologically significant in the context of GERD, as bitter constituents are known to stimulate digestive secretions, regulate gastric motility, and reduce hyperacidity. The characteristic odor and light brown color indicate the presence of naturally occurring aromatic phytoconstituents and tannins, respectively, which are consistent with the known drug profile of the ingredients.

B. Physicochemical Study

Total Ash Value (7%):

The total ash value reflects the total inorganic content of a drug, including both physiological and non-physiological ash. The recorded value of 7% is within acceptable limits and indicates the absence of excessive inorganic impurities or adulterants. A controlled ash value assures the purity of the formulation and confirms that the mineral content does not interfere with the therapeutic action of the drug in managing gastric hypersecretion associated with GERD.

Acid Insoluble Ash (00)

The acid insoluble ash value was found to be nil (00), which is a highly favorable finding. This indicates the complete absence of silica-based contaminants such as sand or soil, thereby confirming the high degree of purity and cleanliness of the raw materials used in the formulation. In the context of GERD management, this ensures that no extraneous matter interferes with the drug's mucosal protective and anti-secretory activity.

Particle Size (425 µm – 250 µm)

The particle size of the coarse powder was found to be in the range of 250–425 µm, which is appropriate for a Kwatha (decoction-based) preparation intended for further processing. Uniform particle size enhances the extractability of active phytoconstituents during decoction preparation, thereby ensuring consistent bioavailability of therapeutic compounds relevant to GERD.

Loss on Drying (10.74%)

Loss on drying is a measure of residual moisture content in the powdered drug. The value of 10.74% is slightly on the higher side and suggests that the sample retains moderate moisture. Excess moisture can promote microbial growth and enzymatic degradation of active principles. For a formulation used in GERD — where stability of anti-inflammatory, antacid, and mucoprotective compounds is essential — moisture control during storage is critically important. Proper airtight packaging and storage in cool, dry conditions are recommended.

Water Soluble Extract (11.8%)

The water-soluble extractive value of 11.8% indicates the proportion of constituents that are soluble in aqueous medium. Since Dashanga Kwatha is traditionally administered as an aqueous decoction, this value is particularly relevant. Water-soluble constituents such as tannins, mucilage, glycosides, and ascorbic acid — known for their gastroprotective, anti-ulcer, and antioxidant properties — are likely responsible for the formulation's efficacy in GERD management.

Alcoholic Soluble Extract (4%)

The alcoholic extractive value was 4%, reflecting a relatively lower content of alcohol-soluble constituents such as flavonoids, alkaloids, and some terpenoids. These compounds contribute to the anti-inflammatory and antioxidant activity of the formulation, which is significant in reducing esophageal mucosal inflammation caused by chronic acid reflux in GERD patients.

pH (5%) – 5.6

The pH of the formulation was recorded as 5.6, indicating a mildly acidic nature. This is consistent with the presence of organic acids, tannins, and ascorbic acid (Vitamin C from Amalaki) in the formulation. A mildly acidic pH is physiologically compatible with the gastric environment and does not aggravate the existing acidic condition in GERD. Furthermore, the buffering capacity of the formulation's natural constituents may help in moderating excessive gastric acidity, thus providing symptomatic relief.

Bulk Density (0.304 g/ml) and Tap Density (0.375 g/ml)

Bulk density and tap density are important parameters for assessing the flow and compressibility characteristics of powdered formulations. The bulk density of 0.304 g/ml and tap density of 0.375 g/ml indicate a moderately free-flowing powder with acceptable compressibility. The Carr's Index calculated from these values falls within the range suggestive of fair to passable flow, which is adequate for the intended dosage form.

TLC Profile

Thin Layer Chromatography (TLC) was performed using ethanol as the extracting solvent and Toluene: Ethyl acetate (9:1) as the mobile phase. Under visible light, no Rf value was detected, while

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under UV 254 nm, Rf values of 0.33, 0.67, and 0.83 were observed. Under UV 366 nm, multiple spots at Rf values of 0.22, 0.33, 0.39, 0.61, 0.67, 0.72, and 0.89 were detected. The diverse TLC fingerprint confirms the presence of a complex mixture of phytoconstituents including flavonoids, alkaloids, and phenolic compounds. This multi-compound profile is characteristic of a polyherbal formulation and supports its multi-targeted therapeutic action in GERD, where anti-secretory, anti-inflammatory, mucoprotective, and antioxidant mechanisms collectively contribute to disease management.

CONCLUSION

Pharmacognostic and physicochemical evaluation of Dashanga Kwatha confirmed the botanical authenticity and standard quality of the formulation as per API and PSAF guidelines. Physicochemical parameters including total ash (7%), acid insoluble ash (nil), pH (5.6), and water soluble extract (11.8%) were within acceptable limits. Loss on drying (10.74%) was marginally above the permissible limit, requiring improved storage conditions. Phytochemical screening revealed the presence of tannins, flavonoids, glycosides, alkaloids, and mucilage, supporting its gastroprotective and anti-secretory efficacy in GERD management. The data generated serves as a valuable reference standard for future quality control and standardization of Dashanga Kwatha.

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