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PHARMACEUTICAL EVALUATION OF *PATOLADI GANA*- A POLYHERBAL FORMULATION FROM *ASHTAANG HRIDYA*

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ABSTRACT

Background: *Patoladi Gana* is mentioned in *Shodhanai Gana Sangrah* of *Ashtang Hridya Sutrasthana* by *Acharya Vagbhat,* which is effective in various disorders. For the therapeutic efficacy of any drug, the genuineness of that drug counts. If the drugs are adulterated, then the quality of preparation cannot give the desired result. So, a detailed pharmaceutical study of the drug is needed, including Authentication and Standardization of that drug. Various formulations in Ayurveda have already proven their efficacy but need to be analyzed by modern techniques in this current era. So, for this present study, *Patoladi Gana* was selected for pharmaceutical evaluation to determine its authenticity.

Material and Methods: The raw material was procured, and a preliminary physiochemical analysis was performed. Analysis of samples was conducted as per API standards. After Authentication and Standardization, the powder of raw drugs was mixed in equal quantities to prepare the formulation.

Results: Identification and Physiochemical analysis were made, and results were noted. All the raw drugs were authenticated as per the species in the classics. Organoleptic parameters of the raw drugs

and the study drug were according to the standards. The results of Standardization comply with the standards given in API.

Conclusion: The present work has provided referential information for the correct identification and Standardization of the crude drug. These findings will be helpful in establishing the Standardization of *Patoladi Gana* in the future.

Keywords: *Patoladi Gana,* Pharmaceutical evaluation, Standardization, Physiochemical analysis

INTRODUCTION:

Prevention and treatment of diseases through Ayurveda is a boon to humankind as it is relatively safe for the human body. Ayurveda is in high demand globally for its safety and cost-effectiveness **[1]**. In the case of herbal drugs, consistency in the chemical composition and bioactivity are essential requirements for their safe and effective use. Quality is the primary need for the safety and efficacy of plant-derived medicines. The problem with Ayurvedic drugs is Quality control. Most drugs are polyherbal formulations in Ayurvedic preparations, and proper quality control is still a severe issue. Many ayurvedic medicines face problems like lack of quality, lack of Authentication of raw material, and lack of appropriate Standardization **[2]**. So, selecting suitable plant material is an important task. So, it is necessary to standardize Ayurvedic formulations to assure their purity, safety, and efficacy. Various drugs in Ayurveda need to be analyzed by modern techniques for their composition and strength. Thus, there is a need to ensure the quality of Ayurvedic drugs.

In Ayurveda, various formulations are there that are effective in multiple disorders. *Patoladi Gana* is one of them that Acharya Vagbhat mentions in *Shodhanai Gana Sangrah* of *Ashtang Hridya Sutrasthana* **[3]**. A group of herbs means *Gana,* which is named based on its first ingredient. *Patoladi Gana* is one of 33 *Ganas* frequently used. This Gana contains *Patol, Kutaki, Chandan, Murva, Guduchi,* and *Patha.* These drugs pacify *Kapha* and *Pitta* dosha and act on Skin diseases, toxins, fever, Vomiting, Anorexia, and Jaundice **[4]**.

The contents of *Patoladi Gana*, i.e*., Patol* (Trichosanthes dioica) **[5-7]**, *Kutaki* (Picrorhiza kurroa) **[8-11]**, *Chandan* (Santalum album) **[12, 13]**, *Murva* (Clematis gouriana) **[14, 15]**, *Guduchi* (Tinospora cordifolia) **[16, 17]**, *Patha* (Cissampelos pariera) **[18, 19]** have many pharmacological activities like Anti-Inflammatory, Antioxidant, and Immunomodulator, Ameliorative, Anti Diabetic, Anti Toxic, Antipyretic, Antidiarrheal, Antimicrobial, Hepatoprotective, Cholesterol-lowering,

and so can be effective in various health ailments.

To date, no standards are available for *Patoladi Gana*. Hence, the present study has been carried out with the objective of pharmaceutical evaluation of *Patoladi Gana* by assessing its Physiochemical parameters.

MATERIALS AND METHODS

The Pharmaceutical study involved the following operating procedures:

- **Procurement of raw material** – Purchase of raw materials, i.e., *Patol* (Trichosanthes dioica)*, Kutaki (Picrorrhiza kurroa), Chandan (Santalum album) Murva (Clematis gouriana), Guduchi (Tinospora cordifolia) and Patha (Cissampelos pareira*) were from Dadar Pharmacy, Dadar (W), Mumbai. Procurement of *Chandan* was from Mysore Products, Princess Street, Marine line (E), Mumbai.
- **Authentication-** These raw materials were authenticated at the Botany Department of Mithibai College, Vile Parle (West), Mumbai.
- **Preparation and Standardization of *Patoladi Gana*-** The study drug was prepared at the Pharmacy of Department of *Ras-shastra & Bhajshajyakalpana* at D.Y. Patil University, School of Ayurveda, Nerul Navi Mumbai. Raw materials were finely powdered and mixed in equal proportion. Organoleptic parameters study and physiochemical analysis for Standardization of these raw materials and the prepared study drug were done at Alarsin Pharmaceuticals, Andheri (E), Mumbai.

Organoleptic parameters: These were documented using the appearance, color, odor, and taste of the drug.

Physiochemical parameters:

Determination of pH values [20]

The pH value of an aqueous liquid may be defined as the common logarithm of the reciprocal of the hydrogen ion concentration expressed in g per liter. The pH measures hydrogen ion concentration, which measures its acidity. The acidity or alkalinity of a solution has a profound influence on the decomposition of the drug. If it is very acidic or less alkaline, there will be more decomposition of the drug. pH influences the rate of oxidation. When the pH is low, the system is less readily oxidized. The pH value of a liquid can be determined potentiometrically using

a glass electrode, a reference electrode, and a pH meter, either of the digital or analog type.

Method: One tablet of pH 4, pH 7, and pH 9.2 was dissolved in 100ml of distilled water. The electrode was rinsed thoroughly with distilled water. 1ml of the sample was taken and made up to 10ml with distilled water and filtered. The filtrate was used for the experiment. The instrument was switched on to warm the pH meter. pH 4, 7, and pH9 solutions were introduced and the pH was adjusted by using the knob to 4.02, 7, and 9.2, respectively. The pH reading was checked without adjusting the knob. Then the sample solution was introduced, and the reading was noted. Repeated the test four times, and the average reading was taken as a result.

Determination of Moisture Content (Loss on drying) [21] 10 g of the drug was placed in a tared evaporating dish. It was dried at 105˚C for 5 hours in a hot air oven and weighed. The drying continued until the difference between two successive weights was less than 0.01 after cooling in desiccators. The moisture percentage was calculated concerning the weight of the sample.

Total Ash [22] 2 g of accurately weighed sample was incinerated in a tared platinum crucible at a temperature not exceeding 450˚C until carbon-free Ash was obtained. The percentage of Ash was calculated with reference to the weight of the sample.

Acid insoluble Ash [22] To the crucible containing total Ash, 25ml of dilute hydrochloric acid was added. The insoluble matter was collected on ashless filter paper (Whatman 41) and washed with hot water until the filtrate was neutral. The filter paper containing the insoluble matter was transferred to the original crucible, dried on a hot plate, and ignited to constant weight. The residue was allowed to cool in a suitable desiccator for 30 min and weighed without delay. Then, the content of acid-insoluble Ash was calculated with reference to the air-dried drug.

Water soluble ash [22] The Ash was boiled for 5 min with 25 ml of water. Then, the insoluble matter was collected on an ashless filter paper, washed with hot water, and ignited for 15 minutes at a temperature not exceeding 450˚C. The weight of the insoluble matter

was subtracted from the weight of the Ash, and the difference in weight was represented as the water-soluble Ash. The percentage of water-soluble Ash was calculated with reference to the air-dried drug.

Water soluble extract [21] 5 grams of the air-dried drug was macerated with 100ml of water in a closed flask, frequently shaking for six hours, and allowed to stand for eighteen hours. It was filtered rapidly, taking precautions against loss of solvent; 25ml of the filtrate was evaporated to dry in a tarred flat-bottomed dish, dried at 105°C to constant weight, and weighed. The percentage of the alcohol-soluble extract with reference to the air-dried drug was calculated.

Alcohol soluble extract [21]: 5 grams of the air-dried drug was macerated with 100ml of ethanol in a closed flask, frequently shaking for six hours, and allowed to stand for eighteen hours. It was filtered rapidly, taking precautions against loss of solvent; 25ml of the filtrate was evaporated to dry in a tarred flat-bottomed dish, dried at 105°C to constant weight, and weighed. The percentage of an alcohol-soluble extract with reference to the air-dried drug was calculated.

OBSERVATION AND RESULTS:

- The samples were identified using the technique of Microscopy and Phytochemical test, and they were confirmed as follows in **Table 1**.
- The results of physiochemical analysis for Standardization of these raw materials and the prepared study drug are as follows in **Table 2 and Table 3**.

Table 1: Raw drugs of *Patoladi Gana*

S. No.	Drug	Botanical name	Family	Part used
1	*Patol*	*Trichosanthes dioica*	Cucurbitaceae	Whole plant
2	*Kutaki*	*Picrorrhiza kurroa*	Scrophulariaceae	Rhizomes
3	*Chandan*	*Santalum album*	Santalaceae	Stem bark
4	*Murva*	*Clematis gouriana*	Ranunculaceae	Leaves
5	*Guduchi*	*Tinospora cordifolia*	Menispermaceae	Stem
6	*Patha*	*Cissampelos pareira*	Menispermaceae	Stem

Table 2: Organoleptic parameters of *Patoladi Gana*

S. No.	Drug Name	Parameters			
		Appearance	Colour	Odour	Taste
1	*Patol*	Dry Bharad	Brownish Green	Herbaceous	Bitter
2	*Kutaki*	Dry Roots	Dark Brownish Black	Pleasant	Bitter
3	*Chandan*	Dry Stem Pieces	Light Brown	Pleasant	Slightly bitter
4	*Murva*	Dry leaves & stem	Greenish brown	Indistinct	Slightly bitter
5	*Guduchi*	Dry Stem pieces	Greenish Brown	Characteristic	Very Bitter
6	*Patha*	Dry Hard cylindrical stem	Creamish Brown	Faint aromatic	Bitter
7	*Patoladi Gana*	Fine Powder	Light Yellowish Brown	Characteristic	Bitter

Table 3: Physiochemical analysis for *Patoladi Gana*

S. No.	Drug Name	Parameters				
		Moisture content	Ash value	Acid Insoluble Ash	Alcohol Soluble Extractive Value	Water Soluble Extractive Value
1	*Patol*	3.2%	8.36%	1.80%	11.30%	21.61%
2	*Kutaki*	3.0%	4.47%	0.47%	13.23%	24.18%
3	*Chandan*		0.82 %	0.06 %	10.21 %	2.75 %
4	*Murva*	3.2 %	2.41 %	0.21 %	8.81 %	15.76 %
5	*Guduchi*	3.6 %	8.31 %	1.04 %	4.91 %	14.82 %
6	*Patha*	4.0 %	5.13 %	0.63 %	12.14 %	14.72 %
7	*Patoladi Gana*	4.0 %	11.87%	6.38 %	13.25 %	8.03 %

The pH of *Patoladi Gana*- 5.4

DISCUSSION

For therapeutic efficacy, the quality of the plant drug must be good. So, a detailed study of that drug is required before its use. The detailed pharmaceutical analysis of the plant helps us to differentiate between closely related species of the same genus or related genera of the same family. It is also the first step to standardizing a drug which is the absolute need. If the quality of plant drugs is not good, then their formulation cannot give the desired result **[23]**.

Patoladi Gana is a polyherbal formulation from *Ashtaang Hridya.* Raw materials were procured from authentic sources. The raw drugs were authenticated prior to the preparation of the study drug. Organoleptic characteristics like appearance, color, odor, and taste of the raw drugs and the study drug were according to the standards. All the raw drugs were authenticated as per the species in the classics. The raw drugs and the study drug were standardized using a pharmacognostical study. The standard protocols available for various procedures were adopted. The results obtained were compared with the standard values given in API **[24]**. The values for *Kutaki* (Picrorrhiza kurroa)*, Chandan* (Santalum album)*, Guduchi* (Tinospora cordifolia), and *Patha* (Cissampelos pareira) were matched with the standards values given in API. The standard values for *Patol* (Trichosanthes dioca) and *Murva* (Clematis gouriana) have not been reported in API; hence the values obtained from *Patol* and *Murva* analysis could not be compared. Thus, the sample complies with the standards per Ayurvedic pharmacopeia.

Thus, the appearance of similar characters among the drugs obtained from authentic sources and those with the characters mentioned in API shows that the selection of the drugs was genuine.

For *Patoladi Gana* formulation, C*hurna kalpana* was preferred. The raw drugs were finely powdered, and the study drug was prepared by mixing them in equal

proportion, as the proportion of ingredients is not mentioned **[25]**.

Physiochemical parameters were selected to evaluate the quality of raw materials and the study drug, as these are the minimum parameters required.

The drug's absorption, efficacy, and irritability depend on its pH value. The pH conventionally represents the acidity and alkalinity of the drug. If the drug is very acidic or alkaline, it irritates the tissues. The moisture content in any formulation should be optimum as moisture can protect microbial growth. The moisture content of the drug was found to be 4.0% w/w. Total Ash value was 11.87% w/w. The ash value usually represents the inorganic residues such as phosphates, carbonates, and silicates in herbal drugs. These are essential indices to illustrate the quality as well as purity of herbal medicine. This parameter has the utmost importance in the quality control and Standardization of drugs. More the inorganic substances present in drugs, the higher will be the ash value. Acid-insoluble ash value shows how many fine soil and sand particles are present in the drug was 6.38 % w/w. Before absorption, a drug must first pass into a solution, so the acid insoluble ash test for the drug is essential therapeutically. It provides a step towards the evaluation of the physiological availability of the drug. Various components have their solubility in particular media. The solubility of Ash finds out the impurities in the drug. Here soluble principles of the drug were seen in water and alcohol. In water, it was 13.25 % w/v; in alcohol, it was 8.03 % w/v.

FUTURE SCOPE:

As per available literature, *Patoladi Gana* can treat various health ailments. This efficacy can be studied through Pre-clinical and Clinical studies after proper Standardization of *Patoladi Gana.* Thus, it may help to validate the concepts of Ayurveda.

CONCLUSION

From the above discussion, the conclusion is drawn. All raw and study drugs comply with the standards as per Ayurvedic pharmacopeia except *Patol* and *Murva.* Organoleptic parameters and physicochemical analysis of the study drug and its content indicate the genuineness of the drug. Thus, the present work has provided referential information for the correct identification and Standardization of the crude drug, which will help establish the Standardization of *Patoladi Gana* in the future.

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Annexure for Images:

Patol **(Trichosanthes dioica)**	***Kutaki*** **(Picrorhiza kurroa)**
	
Chandan **(Santalum album)**	***Murva*** **(Clematis gouriana)**
	

Guduchi **(Tinospora cordifolia)**	***Patha*** **(Cissampelos pareira)**
	
Patoladi Gana **Formulation**