

## PHYSICOCHEMICAL AND PHYTOCHEMICAL STUDY OF INGREDIENTS OF AN AYURVEDIC POLYHERBAL FORMULATION- ADITYAPAK GUGGULU

Barman Kamal Kr.<sup>1</sup>, Sharma Rama Kanta<sup>2</sup>

<sup>1</sup>Ph.D Scholar, Senior Scientific Officer, Govt. Ayurvedic College, Guwahati, Assam

<sup>2</sup>Professor, Deptt. of Rasashastra & Bhaishajya Kalpana, Govt. Ayurvedic College, Guwahati, Assam, India

Email: [kamalkb31@rediffmail.com](mailto:kamalkb31@rediffmail.com)

### ABSTRACT

*Adityapak Guggulu* is a poly herbal formulation widely used by the practitioners of Ayurveda. The authentication and standardization of raw materials used in the formulation is the prerequisite steps. The present study was designed to evaluate the physicochemical and phytochemical analysis of the different raw materials used in the preparation of *Adityapak Guggulu*. Physicochemical parameters were carried out for determination of loss on drying, total ash, acid insoluble ash and extractive values. Whereas, phytochemical investigation was carried out to estimate the presence of phytosterols, carbohydrates, tannins, alkaloids, flavonoids, proteins, glycosides. Results revealed the presence of phytochemicals mostly in all the drugs. In physicochemical analysis maximum parameters of the study showed the value within the range as per Ayurvedic pharmacopoeia. Results confirmed the presence of therapeutically potent compounds in all the raw materials. The present study will be helpful in evaluating the quality and purity of the crude drug and laying down the pharmacopoeial standards.

**Keywords:** *Adityapak Guggulu*, Physicochemical, Phytochemical.

### INTRODUCTION

*Adityapak Guggulu*, which was described by Sri Chakrapanidatta in his treatise *Chakradatta* for treatment of various *vata*vyadhi, is widely used by the practitioners of Ayurveda. It contains 17 ingredients namely- *Guggulu* (*Commiphora wightii*), *Haritaki* (*Terminalia chebula*), *Bibhitak* (*Terminalia bellerica*), *Amalaki* (*Phyllanthus emblica*), *Pippali* (*Piper longum*), *Dalcini* (*Cinnamomum zeylanicum*), *Ela* (*Elettaria cardamomum*), *Bilva* (*Aegle marmelos*), *Shyonak* (*Oroxylum indicum*), *Gambhari* (*Gmelina arborea*), *Patala* (*Stereospermum suaveolens*), *Agnimantha* (*Clarodandrum phlomidis*), *Shalaparni*

(*Desmodium gangeticum*), *Prisniparni* (*Uraria picta*), *Brihati* (*Solanum indicum*), *Kantakari* (*Solanum xanthocarpum*) and *Gokshur* (*Tribulus terrestris*)<sup>1</sup>.

Specific part of the above mentioned plants are used in the formulation for preparation of the drug.

Physicochemical analysis and phytochemical screening of medicinal plants is highly essential to discover and develop genuine therapeutic effects with improved efficacy. Both the study plays a major role in standardization and identification of all the drugs. In this era of commercialization mostly each and every thing is being adulterated. So, we cannot expect that

the raw materials which are used in the formulation are not adulterated<sup>2</sup>. The major cause in acceptance of the herbal medicine is due to the shortage of standard quality. Authentication and standardization are pre-requisite steps, especially for herbal drugs and their formulations in traditional systems of medicine<sup>3</sup>. In ancient times, the raw materials were collected from original source by the practitioners of Ayurveda. During the collection of the plant material all care was taken by them as described in Ayurvedic Classics, viz. age of the plants, part of the plant to be collected, season of collection, time of collection etc<sup>4</sup>. So, in this present era it becomes necessary to evaluate any drug by various means like organoleptic character, physicochemical analysis, phytochemical screening etc.

The assurance of standardization of medicinal plants in terms of safety, quality and efficacy has become an important issue in the present scenario. It becomes extremely important to make an effort towards standardization of the plant material used for therapeutic purposes<sup>5</sup>.

The aim of the present study is to carry out preliminary phytochemical screening and physicochemical analysis of the plant materials which are used in the preparation of *Adityapak Guggulu*.

## MATERIALS AND METHODS

### Collection of plant material :

The raw materials were collected from different places of India are as follows-

**Table 1:** Source of raw materials

Sl.No.	Name of raw materials	Part collected	Place of collection/ Procurement
1	<i>Guggulu</i>	Exudate	Gujarat State Forest Development Corporation Ltd., Vadodara
2	<i>Haritaki, Bibhitak, Amalaki</i>	Fruit pulp	Botanical Garden and campus of Govt. Ayurvedic College, Guwahati.
3	<i>Bilva, Shyonak, Gambhari</i>	Root bark	-do-
4	<i>Shalaparni, Brihati, Kantakari</i>	Root	-do-
5	<i>Agnimantha</i>	Root bark	Jaipur, Rajasthan.
6	<i>Gokshur</i>	Root	-do-
7	<i>Patala</i>	Root bark	Karbi Anglong dist., Assam
8	<i>Prisniparni</i>	Root	-do-
9	<i>Dalcini</i>	Stem bark	-do-
10	<i>Pippali</i>	Fruit	Boko village, Assam
11	<i>Elachi</i>	Fruit	Purchased from local market

All the sample of raw materials were identified and authenticated in the Department of *Dravyaguna Vigyan*, Govt. Ayurvedic College, Guwahati.

### Place of work:

Physico-chemical and phytochemical studies were carried out in State Drug Testing Laboratory (AYUSH), Govt. Ayurvedic College, Guwahati-14.

### Extraction:

The powdered plant material was subjected to continuous extraction with Soxhlet apparatus<sup>6</sup>. The powder plant drug was successively extracted with solvents like petroleum ether, benzene, chloroform, acetone and methanol respectively. The solvent extract was then concentrated by distilling off the solvent under reduced pressure.

### Physicochemical evaluation:

Physicochemical parameters were determined as per the methods described in the Ayurvedic Pharmacopoeia of India<sup>7</sup>. Ash value, loss on drying, acid insoluble ash, alcohol soluble extractive, water soluble extractive were determined. The heavy metal analysis was also done for all the raw materials.

### Phytochemical Screening:

The aqueous and methanolic extracts along with other solvent extracts of raw materials were studied for presence or absence of various phytochemicals like alkaloids, carbohydrates, flavonoids, glycosides, phenols, tannins, saponins, steroids and terpenoids by using precipitation and coloration reactions<sup>8</sup>.

## RESULT AND OBSERVATION

The raw materials were investigated in a systematic manner for phytochemical and physicochemical as-

pects. The results of the physicochemical and phytochemical properties are presented in Table 2, Table 3 respectively.

**Table 2:** Physicochemical analysis of the raw materials

Name of Sample	Foreign Matter (%)	Loss on drying (%)	Total ash (%)	Acid insoluble ash (%)	Water soluble extractive (%)	Alcohol soluble extractive (%)
<i>Guggulu</i>	3.88	10.72	4.56	1.54	52.23	38.54
<i>Haritaki</i>	0.10	2.95	2.78	0.55	66.55	54.20
<i>Bibhitak</i>	0.45	2.21	4.02	0.89	60.88	45.55
<i>Amlaki</i>	0.22	3.44	3.22	0.92	59.34	43.66
<i>Pippali</i>	0.34	4.22	4.98	1.55	11.22	13.55
<i>Elachi</i>	0.00	1.23	3.65	3.21	8.87	5.85
<i>Dalcini</i>	0.00	5.33	2.11	1.33	17.34	13.22
<i>Bilva</i>	0.34	3.67	4.76	0.55	12.65	9.56
<i>Gambhari</i>	0.29	2.22	3.78	0.92	11.47	8.32
<i>Shyonak</i>	0.29	4.22	5.78	1.29	12.16	7.19
<i>Agnimantha</i>	1.34	1.56	3.78	0.78	8.22	3.56
<i>Patala</i>	1.07	3.88	6.88	3.14	10.37	9.40
<i>Shalaparni</i>	0.88	1.56	4.55	1.22	9.21	5.88
<i>Prishniparni</i>	1.12	1.56	6.28	2.22	12.34	8.22
<i>Brihati</i>	0.87	0.98	4.27	0.78	10.03	7.56
<i>Kantakari</i>	0.11	1.34	7.23	2.45	11.21	7.23
<i>Gokshur</i>	0.56	2.25	7.30	1.56	12.79	4.66

**Table 3:** Phytochemical analysis of the raw materials

Name of Ingredients	Phytosterols	Carbohydrates	Saponins	Tannin	Alkaloids	Flavonoids	Anthrocyanins	Proteins	Terpenoids	Glycosides
<i>Guggulu</i>	+	-	-	+	+	+	-	+	-	-
<i>Haritaki</i>	+	+	-	+	+	+	-	+	-	+
<i>Bibhitaki</i>	+	+	-	+	+	+	-	+	-	+
<i>Amalaki</i>	+	+	-	+	+	+	-	+	-	+
<i>Pippali</i>	+	+	-	+	+	+	-	+	-	+
<i>Tvak</i>	+	+	-	+	+	+	-	+	-	+
<i>Soksmaila</i>	+	+	-	+	+	+	-	+	-	-
<i>Bilva</i>	+	+	-	+	+	+	-	+	-	-
<i>Syonaka</i>	+	+	-	+	+	+	-	+	-	-
<i>Gambhari</i>	+	+	-	+	+	+	-	+	-	-
<i>Patala</i>	+	+	-	+	+	+	-	+	-	-
<i>Agnimantha</i>	+	+	-	+	+	+	-	+	-	-
<i>Salaparni</i>	+	+	-	-	+	-	-	+	-	-
<i>Prsniaparni</i>	+	+	-	+	+	+	-	-	-	+
<i>Brihati</i>	+	+	-	-	+	+	-	-	-	+

<i>Kantakari</i>	+	+	+	+	+	+	-	+	+	+
<i>Gokshur</i>	+	+	+	+	+	+	-	+	+	+

## DISCUSSION

Phytochemical and physicochemical screening of the plant material is the preliminary and key aspect to establish the quality of herbal medicine. To set the standards for raw drugs quantitative estimation of some parameters is highly beneficial. Preliminary phytochemical study is helpful to determine the chemical constituents of plant materials. Phytochemical analysis revealed the presence of alkaloids, flavonoids, glycosides and polyphenolic compounds in ethanolic, hydro-alcoholic and aqueous extracts. The physicochemical analysis of raw drugs is essential for identifying adulteration or incorrect handling of drugs. It also helps to confirm the quality and purity of plant. In the present study, a slight variation in the results of physicochemical analysis was observed for some raw materials in comparison with the Ayurvedic pharmacopoeial standard. The maximum parameters of the study showed the value within the range as per the Ayurvedic Pharmacopoeia. Out of the 17 plant materials, the variation in total ash, acid insoluble ash, water-soluble extractive and alcohol soluble extractive was observed in 1, 4, 5 and 1 selected plants respectively. The preliminary phytochemical analysis showed the presence of phytosterols and alkaloids in all the plant, carbohydrate and flavonoid in 16 plant, tannin and protein in 15 plants, glycoside in 9 plant, saponin and terpenoids in 2 plants of the selected medicinal plants.

There may be several reasons for the slight variation in the results of physicochemical and phytochemical analysis. It may be due to different geographical conditions, environmental conditions, period of cultivation and harvesting, age of the plant, method of collection etc. The method of powdering and extraction also may be the causes for variation. Hence, this study has been carried out along with the parameters given in pharmacopoeia to determine the quality of the raw drugs, as these are used in the preparation of Ayurvedic formulations.

## CONCLUSION

Physicochemical and phytochemical study is the major dependable measures for authentication of the raw drug materials. It works as standard data for quality control studies of pharmaceutical preparations. The quality of formulation cannot give the desirable results

if adulterated or substandard raw drugs are used in the preparation. The standardization parameters done in the study provide useful information regarding the identification and authentication of the raw materials. The results obtained from the analysis of the raw materials used in the preparation of *Adityapak Guggulu*, may be used as suitable quality control measures.

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