

PRELIMINARY PHYTOCHEMICAL STUDY OF GAMBHARI (*Gmelina arborea*) FRUIT

Kuber Sankh¹, Ashalatha M²

1. Ph.D Scholar, Department of dravyaguna, Government Ayurveda medical college, Bengaluru, Karnataka, India
2. Professor and HOD, Department of dravyaguna, Government Ayurveda medical college, Bengaluru, Karnataka, India

ABSTRACT

Gmelina arborea an important medicinal plant, it is one of the most widely cultivated species of the family Verbenaceae. It is commonly known as “Gamhar” and it is a beautiful fast growing tree found throughout India and one of the herbs mentioned in all ancient scriptures of Ayurveda. It has been used in traditional Indian medicine (Ayurveda) having important source of chemicals of immense medicinal and pharmaceutical importance. It is the important herb mentioned in Ayurveda and used as *Medhya* (Intellect power), *Keshya* (Hair tonic) and *Rasayana* (Rejuvenator). The present article provides all necessary information regarding its phytochemical investigations. This review emphasizes on the detailed phytochemical components of fruit of *Gmelina arborea*. Any herb has to be standardized before its use for clinical conditions, hence the present study is taken up to study Pharmacognostical and phytochemical profile of *Gambhari* fruits, hence standardisation data can be generated.

Keywords: Fruit, *Gmelina arborea*, Phytochemical, Verbenaceae

INTRODUCTION

In the last few decades there has been an exponential growth in the field of herbal medicine. It is getting popularized in developing and developed countries owing to its natural origin and lesser side effects¹. Nature has provided a complete storehouse of remedies to cure all ailments of mankind. About 80% of the world population depending on herbal based alternative system of medicine like Ayurveda. Herbal drugs have played a vital role in curing diseases throughout history of mankind. Despite the major advances in the modern medicine, the development of new drugs from natural products is still considered important. An estimated 70,000 plants are used medicinally. Ayurveda utilizes about 2000 plants to cure different ailments. There are very few medicinal herbs of commercial importance, which are not culti-

vated in our country. Approximately 1250 Indian medicinal plants are used in formulating therapeutic preparations, according to Ayurveda and other traditional systems of medicine². The evaluation of various plant products according to their traditional uses and medicinal value based on their therapeutic efficacy leads to the discovery of newer and recent drugs for treating various ailments. This fact forms the basis for the development of new drugs from various plant sources. One of such plants of medicinal value is *Gmelina arborea*, belonging to the family Verbenaceae, commonly known as ‘Gamhar’. *Gmelina* is one of the important genera of the family, consisting of about 33 species. It is a beautiful fast growing deciduous tree, which is a vital ingredient of the “*dasamula*”³. This particular herb is one of

the ingredient in Dashamula and has been used for its valuable medicinal properties like Medhya (Intellect power), Keshya (Hair tonic) and Rasayana (Rejuvenator) .

Aim of study: Pharmacognostic and phytochemical study of Gambhari phala churna.

MATERIALS AND METHODS:

Procurement of drug used for present study:

All reagents and chemicals were procured from Merck Pvt. Ltd., Navi Mumbai, Maharashtra, India. Urea, n-butanol GR 80°C and petroleum ether AR 40-60°C were procured from Loba Chemie Pvt. Ltd., Mumbai, India and from authorized dealer. Botanically identified *Gambhari* fruit was collected from area surrounding Gadag, Dharwad and Shirasi and authenticated by expert and voucher specimen (DG/DGM/18/2011-12) kept in Department of Dravyaguna, DGM Ayurveda Medical College, Gadag.

Preparation of samples: The Fruits of Gambhari (*Gmelina arborea*) were collected from natural habitat. Fruits were carefully checked for the presence of infested ones and after removing them, washed with water to remove dust. Sample was then dried under shade. Completely dried Gambhari fruits were then pounded to convert them in to fine powder and filtered using cloth and preserved in air-tight food grade plastic containers.

Pharmacognostical study: It includes both macroscopic and microscopic study of sample was carried out in Central analytical laboratory, Post graduate studies and research centre JSS Ayurveda medical college and hospital , Mysore.

Organoleptic study: The macroscopic characters of the sample were observed for colour, size, shape, odour, taste and fractures.

Microscopic examination^{4,5}: The drug was soaked in water for 12 hours before carrying

out the procedure. The drug was held between thumb and index finger in the left hand, with help of a sharp razor blade thin sections were taken and put into watch glass containing water. A thin uniform and entire section was selected and transferred on to a clean glass slide with the help of a brush. A drop of safranin stain was put and left for few minutes. Excess stain was removed by washing with water. Section was mounted with 1-2 drops of 50% glycerine and covered with a clean cover glass. Excess glycerine was removed by blotting paper and observed under microscope.

Powder microscopy^{6,7}: Powder of drug was mixed with chloral hydrate solution and made warm. With this solution slides were prepared and observed for lignified elements. For starch grains slides were prepared with iodine solution and observed under microscope.

Physico-chemical analysis: Physico-chemical analysis were carried out by following the parameters as mentioned^{8,9,10}.

Successive solvent extractions¹¹: Accurately weighed 50 grams of the coarsely powdered drug was taken in the glass cylinder of the Soxhlet apparatus just above a piece of cotton which prevents entry of drug into the siphon tube. The drug was successively extracted with four solvents, which were from non-polar to polar in nature and maintained at the specific temperatures.

Extractive values are determined by following standard guidelines^{12,13}

Analytical study: Preliminary phytochemical investigations are carried out by following standard procedure^{14,15,16}

RESULTS AND DISCUSSION.

Table no 1: Organoleptic study :

Characters	Sample
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Physical appearance	Hard and cylindrical.
Colour	Dark brown
Odour	Characteristic
Taste	Sweet
Extra features	A drupe, ovoid, crinkled, black, 1.5-2.0 cm long, sometimes with portion of attached pedicel, 1-seeded; seed is ovate, 0.5- 1 cm long, 0.4 – 0.6 cm wide, light yellow, smooth surface, seed coat thin, papery; taste oily.

Table no 2: Organoleptic characters of sample of *Gambhari phala powder*

Characters	<i>Gambhari phala</i>
Nature	Fine powder
Colour	Brown
Odour	Characteristic
Taste	Sweet and sour

Fruit: Microscopically fruit shows pericarp differentiated into single layered epicarp, multilayered mesocarp and endocarp. Epicarp consists of single layer of thin walled cells; mesocarp composed of several layers of isodiametric, thin walled, parenchymatous cells; endocarp consisting of multilayered sclerenchyma. Seed shows outer integument consisting of 3-5 rows of crushed, parenchymatous cells fol-

lowed by inner integument consisting of 2-3 rows of thin walled, tangentially elongated, parenchymatous cells; cotyledons consisting of single layered, radially elongated epidermal cells; mesophyll consisting of thin walled cells, filled with oil globules and aleurone grains.

Table no.3: Physicochemical analysis of sample of *Gambhari phala powder*

Parameter	<i>Gambhari phala</i>	Standard values
Total Ash value	5.5%	<6% (Ref.API)
Acid insoluble ash	0.36%	<0.4% (Ref.API)
Water soluble ash	1.05%	NA
Moisture content %	3.5%	NA
Total % of foreign matter	0.632%	<1% (Ref.API)

Table no 4 : Extractive values of sample of *Gambhari phala powder*

Name of the test	<i>Gambhari phala</i>	Standard values
Alcohol soluble extract value	11.4%	>8% (Ref.API)
Water soluble extract value	31.24%	>25% (Ref.API)
P.E extract value	10%	NA

Chloroform extract value	3%	NA
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Table no 5 : Physical properties of extracts

Characters	Colour	Odour	Consistency
P.E extraction	Light brownish yellow	Pungent	Non-sticky
chloroform extraction	Brownish green	Characteristic	Non-sticky
alcohol extraction	Dark brown	Pungent	Sticky
Aqueous extraction	Light brown	Characteristic	Non-sticky
Benzene extraction	Brownish green	Characteristic	Non-sticky

Table no 6: Preliminary phytochemical tests of all samples of *Gambhari phala*:

Tests	Pet ether extract	Benzene extract	Chloroform extract	Ethanol extract	Aqueous extract
Tests for proteins					
a) Biuret test	-ve	-ve	+ve	+ve	-ve
b) Ninhydrin test	-ve	-ve	+ve	+ve	-ve
c) Xanthoproteic test	-ve	-ve	+ve	+ve	-ve
d) Hopkins-Cole test	-ve	-ve	+ve	+ve	-ve
e) Sulphur test	-ve	-ve	+ve	+ve	-ve
Carbohydrates Test for starch					
a) Molisch's test	+ve	-ve	-ve	-ve	+ve
b) Iodine test	NA	NA	NA	NA	NA
c) Fehling's test	+ve	-ve	-ve	-ve	+ve
d) Benedict's test	+ve	-ve	-ve	-ve	+ve
Non-reduction sugar such as sucrose					
a) Benedict's test	+ve	+ve	+ve	+ve	+ve
Tests for Tannins					
a) Gelatin test	-ve	-ve	-ve	+ve	-ve
Anthocyanins a) Aqueous NaOH test	+ve	+ve	+ve	-ve	-ve
b) Conc H ₂ SO ₄ test	+ve	+ve	+ve	-ve	-ve
Glycosides a) Molisch's test	NA	NA	NA	NA	NA
b) Conc H ₂ SO ₄ test	+ve	+ve	+ve	+ve	+ve
c) Keller-kiliani test	+ve	+ve	+ve	+ve	+ve
Saponin					
a) Foam test	-ve	-ve	-ve	-ve	-ve
Flavanoids a) Flavanoids test	NA	NA	NA	NA	NA
b) Pew's test	+ve	+ve	+ve	-ve	+ve
c) Shinoda test	+ve	+ve	+ve	-ve	+ve
d) Aqueous NaOH sol	+ve	+ve	+ve	-ve	+ve
e) Conc H ₂ SO ₄ test	+ve	+ve	+ve	-ve	+ve
Phenols a) Phenol test	-ve	-ve	-ve	+ve	-ve

Steroids a) Salkowski test	+ve	+ve	+ve	+ve	+ve
b) Libermann and Burchard test	+ve	+ve	+ve	+ve	+ve
Alkaloids					
a) Mayer's test	-ve	+ve	+ve	+ve	-ve
b) Wagner's test	-ve	+ve	+ve	+ve	-ve
c) Dragendroff's test	-ve	+ve	+ve	+ve	-ve

(+) indicate the presence of phytochemicals and (-) indicate the absence of phytochemicals

DISCUSSION

1) Foreign matter is material consisting of, Parts of the medicinal plant material, Any organism, part or product of an organism, Mineral admixtures not adhering to the medicinal plant materials, such as soil, stones, sand and dust reported values are well within normal limits, which further accounts for the careful collection of the sample. As sample was collected by self no impurities were found with the sample.

2) Ash values are helpful in determining the quality and purity of crude drugs in powdered form. The total ash usually consists of inorganic radicals like carbonates, phosphates, silicates and silica of sodium, potassium, magnesium and calcium. Such variables are then removed by treating with acid (as they are soluble in hydrochloric acid) and then acid-insoluble ash value is determined. Values of *Gmelina arborea* fruit are well within normal limits. As sample was completely devoid of admixture and physical impurities so ash value was within normal limits.

3) Extractive values (Table 1): These values are useful for evaluation of crude drugs and gives an idea about the nature of soluble phyto-constituents. Extractive value of fruit in aqueous media is more than value of alcohol and petroleum ether and it is very less in chloroform, which suggests the presence of more water soluble compounds (polar) like glycosides, sugars, amino-acids and salts

compared to non polar compounds like free alkaloids, terpenoids and sterols.

4) Phytochemical study: Phytochemical study reports are suggest all the parameters were well within normal limits mentioned in AFI.

CONCLUSION

Gmelina arborea is an important medicinal plant indicated in the ancient literature of traditional Indian medicine. The fruit Gambhari is having potential medicinal values and this review more emphasizes on the phytochemical investigations, which can be investigated further to achieve lead molecules in the search of novel herbal drugs.

Preliminary phytochemical study of all extracts revealed that protein were absent in petroleum ether, aqueous and benzene extract, while present in chloroform and ethanol extract. Flavonoids absent only in ethanol extract, phenols absent in all extracts, alkoids absent in petroleum ether and aqueous extract

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CORRESPONDING AUTHOR

Dr. Kuber Sankh

Ph. D Scholar

Department of dravyaguna, Government Ayurveda medical college, Bengaluru,

Email: kuberss@live.com

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