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Development of quality control parameters for the standardization of bark of *Ficus arnottiana* Miq. (M)

Ramandeep Singh[1*], Ashraf Ali[1], G. Jeyabalan[1], Yogesh Kumar[1], Alok Semwal[2]

[1]*Department of Pharmacy, Sunrise University, Alwar, Rajasthan, India*

[2]*Department of Pharmacy, Himachal Institute of Pharmacy, Paonta Sahib (H.P)*

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ABSTRACT

Objective: To develop a novel standardization technique, which can pave the way for rapid determination of different phytoconstitutents of *Ficus arnottiana* (*F. arnottiana*). Miq. (Moraceae). From extensive literature survey it was revealed that no reports were available on, standardization parameters of *F. arnottiana* Miq. **Methods:** Phytochemical test, TLC analysis, foreign matter, Ash values, swelling index, foaming index, fluorescence analysis, determination of pH, extractive value, moisture content, microbiological analysis and crude fibre content were performed in the present investigation for the quality control of the drug. **Results:** Thus it was thought worthwhile to explore this endangered plant on the basis of its standardization parameters. Alkaloids, saponins, steroid, flavanoids and tannins were found to be present in *F. arnottiana* Miq. extracts. Ash value, acid insoluble ash value, water insoluble ash value, pH determination, Swelling index, foaming index and loss on drying were found to be 2.44%w/w, 0.32%w/w, 1.93%w/w, 8.29, (3.50± 0.23), 1 cm, 11.6%w/w. The study will provide referential information for the correct identification of the crude drug. **Conclusion:** These physicochemical data and phytochemical analysis of different extracts of *F. arnottiana* Miq is useful for further studies for pharmacological screening. In future this study will be helpful for qualitative & quantitative analysis of phytoconstitutes for isolation of newer molecule from *F. arnottiana* Miq.

1. Introduction

Ficus arnottiana (*F. arnottiana*) Miq. is a glabrous tree belonging to family Moraceae also known as Paras pipal. It is distributed throughout India; mostly in rocky hills 1 350 m elevations[1]. The leaves of the plant are used for controlling fertility. Bark of the plant is used as astringent, aphrodisiac, demulcent, depurative, emollient.

It is also useful in inflammation, diarrhea, diabetes, burning sensation, leprosy, scabies, wounds and skin diseases. The fruits of the plant contain β -sitosterol, gluanol acetate, glucose, friedelin[2].

Though the plant and its extracts have been used in the folk medicine extensively, but no scientific evidence for such activities is available in established scientific journals of repute.

1.1. Classification of F. arnottiana Miq.

Kingdom:	Plantae
Division:	Magnoliophyta
Phylum:	Tracheophyta
Class:	Magnoliopsida
Subclass:	Rosidae
Order:	Rosales
Family:	Moraceae
Genus:	*Ficus* L.
Species:	*arnottiana*
Botanical name:	*F. arnottiana*

1.2. Vernacular name

Hindi:	Paras, pipal, paraspipal
Sanskirt:	Parisah, Plaksa, Plasksha, kapithanah
Tamil:	Kallaraci, Kallasasu, Kodi Arasu, Tanavan

*Corresponding author: Ramandeep Singh, Department of Pharmacy, Sunrise University, Alwar (Rajasthan) India.
Tel: +91-9736922900
E-mail: ramandeep_pharma@yahoo.com

Telegue: Kallaravi, Kanda, Ravi
Malayalam: Kallal, Kallarayal
English: Crown (Ceylon)[3]

2. Material and methods

2.1. Plant material

The Plant material *F. arnottiana* Miq. (bark) was collected from Balawala, Dehradun (U.K.), India and identified by the Botanist Dr. Veena Chandra, Department of botany, F.R.I, Dehradun (U.K.) India. The bark is separately dried in shade and preserved in air tight container.

2.2. Plant extracts, chemicals and reagents

The bark was extracted successively with petroleum ether, chloroform, acetone, Methanol and water. All the extracts thus obtained and kept in desicators for future use. All the other chemical and reagents used in this study are analytical grade.

2.3. Development of standard analytical parameters

Macroscopical Evaluation, Microscopic studies, Physical parameters such as Foreign matter, Ash values, Swelling index, Foaming index, Fluorescence analysis, Determination of pH, Extractive value, Moisture content, Microbiological analysis, Heavy metal analysis and Crude fibre content were performed according to the standatd official methods[4,5].

Total phenolic content of *F. arnottiana* Miq. were also determined. Preliminary phytochemical analysis of *F. arnottiana* Miq. extracts were done according to the standard official methods. Thin layer chromatography analysis was done according to the standard protocol[6-8].

3. Results

Organoleptic study revealed the presence of Buff brown colour, stimulant odour and astringent taste and fibrous texture of *F. arnottiana* Miq bark. Microbial content of dried bark was found to be (146.0±7.2) for bacterial and (24.0±2.3) fungal colony grown on nutrient medium containing *F. arnottiana* Miq bark. pH of 1% and 10 % solution of dried bark of plant was found to be 8.29 & 6.88 respectively. Swelling index of dried bark of plant was found to be (3.50±0.23). Foaming index of the dried bark of plant was found to be 100 because height of foam in each

Table 1
Fluorescence nature of Bark powder under ultra violet (UV) radiations.

Sr.No.	Treatment	Day Light	Short UV	Long UV
1	Powder as such	Yellowish Brown	Brown	Brown
2	Powder+Water	Yellowish brown	Brown	Brown
3	Powder+5%$Fecl_3$	Orangish Brown	Dark Brown	Dark Brown
4	Powder+1 M NaOH	Brown	Brown	Dark Brown
5	Powder+H_2SO_4	Black	Black	Black
6	Powder+CH_3COOH	Dark brown	Dark Brown	Black
7	Powder+Picric acid	Yellowish Brown	Dark Brown	Black
8	Powder+Nitric acid	Black	Black	Black
9	Powder+Iodine solution	Brown	Dark Brown	Black
10	Powder+HCL	Dark brown	Dark Brown	Black

Table 2
Ash values of *F. arnottiana* Miq. Bark.

Sr.No.	Ash Value	Results (%w/w)
1	Total ash value	2.44
2	Acid insoluble ash value	0.32
3	Water soluble ash value	1.93

Table 3
Showing the yield and characteristics of *F. arnottiana* Miq. Bark.

Sr. No.	Extract	%age yield	Colour	Odour	Consistency
1	Pet. ether extract	2.86	Heena green	Odorless	Sticky
2	Chloroform extract	1.23	Dark green	Characteristics	Sticky
3	Acetone extract	2.92	Coffee green	Sweet	Sticky
4	Methanol extract	4.78	Chocolate brown	Sweet	Sticky

Table 4
Phytochemical investigation of various extracts of *F. arnottiana* Miq. Bark.

Chemical test		FAPEE	FACE	FAAE	FAME
Carbohydrate	Molish test	–	–	+	+
	Iodine test	–	–	+	+
	Barfoed test	–	–	+	+
	Fehling solution test	–	–	+	+
Saponins	Froth test	–	–	+	+
Sterols	Salkowaski test	+	–	–	–
	Leibermann′ test	+	–	–	–
Proteins and amino test	Biuret test	–	–	–	–
	Ninhydrine test	–	–	–	–
Flavanoids	Ammonia test	–	–	+	+
	Zinc metal test	–	–	+	+
	Shinoda test	–	–	+	+
	Vaniillin – HCL test	–	–	+	+
Volatile oil	Sudan 3 test	–	–	–	–
Tannins	Test with iron salt	–	–	+	+
	Chlorogenic acid test	–	–	+	+
Glycosides	Borntragor ′s test	–	–	–	–
	Keller – Killani test	–	–	–	–
	Legal′ test	–	–	–	–
Alkaloids	Mayer′s reagents	–	+	+	+
	Dragondroff′s reagent	–	+	+	+
	Wagner′s reagents	–	+	+	+
	Hager′s test	–	+	+	+

Table 6
Macroscopical characteristics of *F. arnottiana* Miq. Bark.

Particulars	Bark
Condition	Dried
Colour	Outer surface – greenish brown with brown dots
	Inner surface – reddish brown
Odour	Stimulant
Taste	Astringent
Texture	Rough with fracture
Fracture	Brittle with fibrous
Size	Length 5–7 cm
	Thickness 0.5–2.0 cm

Table 7
TLC data of various extracts of *F. arnottiana* Miq. Bark.

Sr. No.	Extracts and phytoconstitutents	Solvent system	Ratio	No. of spots	R_f	Detecting agent
1.	Pet. ether extract	Chloroform: Methanol	9.5:5	2	0.2,0.8	5% H_2SO_4 in Ethanol
2.	Chloroform extract	Toluene: Diethyl ether: Ethyl acetate	7:1:2	2	0.8,0.9	Anisaldehyde– H_2SO_4
3.	Acetone extract	Toluene: Ethyl acetate	7:3	1	0.8	Anisaldehyde– H_2SO_4
4.	Methanol extract	Toluene: Diethyl ether: Ethyl acetate	7:1:2	2	0.7,0.9	Anisaldehyde– H_2SO_4

test tube is less than 1 cm. Loss in weight of drying was found to be 11.6%w/w. Crude fibre content of dried bark of plant was found to be 2.89%w/w.

All the foreign organic and inorganic matters are absent in the dried plant material. In florescence analysis we treat the bark powder with different reagent and observe them under normal and UV light. The results of florescence analysis & ash value was shown in Table 1 & 2. Percentage Yield and physical characteristics and phytochemical investigation (qualitative chemical analysis) of various extracts *F. arnottiana* Miq. bark are shown in Table 3 & 4. Total Fat and Alkaloid content in the plant bark was found to be 2.71% w/w and 8.62%w/w.

Volatile content in *F. arnottiana* Miq bark was found to be absent. TLC analysis of *F. arnottiana* Miq bark showing the solvent systems and detecting

agents in Table 5. Macroscopical characteristics of *F. arnottiana* Miq bark are shown in Table 6. The results of Heavy metal analysis of *F. arnottiana* Miq was found to be Arsenic, Cadmium & Lead 0.714 3, 0.006 6 and 0.063 6 ppm respectively

4. Discussion

Phytochemicals have been used for the treatment and prevention of various health ailments from time immemorial. A large percentage of the drugs prescribed worldwide are derived from plants and 121 such active compounds are in use.

WHO essential medicine list contain large number of drug from plant origin. Phytochemicals standards were generally used for deciding the identity, purity and strength of the drug source. These parameters were also used to detect the adulterants if present in the plant material[9,10].

Macroscopic Evaluation, Microscopic studies, Physical parameters such as Foreign matter, Ash values, Swelling index, Foaming index, Fluorescence analysis, Determination of pH, Extractive value, Moisture content, Microbiological analysis, Crude fibre content, Total phenolic content, Preliminary phytochemicals analysis, Thin layer chromatography and heavy metal detection can be used as reliable aid for detecting adulteration.

These are simple, but reliable standards will be useful to a layperson in using the drug as a home remedy. Effective formulations have to be developed using indigenous medicinal plants, with proper pharmacological experiments and clinical trials. The manufacture of plant products should be governed by standards of safety and efficacy.

In future, these characters are also used to check the genuine nature of the crude drug, thus it plays an important role in preventing the possible steps of adulteration.

So finally we concluded that these physicochemical data and phytochemical analysis of different extracts of *F. arnottiana* Miq is useful for further studies of pharmacological parameters.

Conflict of interest statement

We declare that we have no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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