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Research Article

STUDY OF FOUR DIFFERENT SAMPLES OF BABBOOLA NIRYASA (*ACACIA ARABICA*) WITH REFERENCE TO THEIR PHYSICO-ANALYTICAL CHARACTERS AND CHROMATOGRAPHIC PROFILE

Shrikanth P.[1]*, Ashalatha M.[2]

[1]Associate Professor, Department of P.G. studies in Dravyaguna, S.D.M. College of Ayurveda, Udupi, Karnataka, India

[2]Professor and Head, Department of P.G. studies in Dravyaguna, Government Ayurveda Medical College, Bangalore, Karnataka, India

*Corresponding Author Email: drshrikanth.acharya@gmail.com

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ABSTRACT

The collection of gums in India does not receive proper attention as it is in the hands of ignorant, illiterate tribal people. Different market samples of the exudate show divergent features and qualities which directly afflicts the quality of the finished product. The market samples of Babbula, along with its original sample collected from plant species, were subjected to organoleptic, physico-chemical and chromatographic evaluation at SDM center for research in Ayurveda and allied sciences, Udupi, Karnataka, India to determine their identity and purity. It was observed that the original sample and the Bangalore samples showed the values which are almost equivalent to reference standards given in Quality Standards of I.M.P. volume 5, page 8 (Table 2). The Chennai sample showed different pattern of bands and peaks and by this observation we can infer that this sample might be from other subspecies of acacia genus or that adulterants might have been added which have altered the chemical profile of the drug.

Keywords: evaluation, Babboola samples, physicochemical, chromatographic profile.

INTRODUCTION

Among different prayojyangas referred in Ayurveda, Niryasas have an important role in the therapeutics. Guggulu, Shallaki, Sarjarasa, Mocharasa, Babboola, Hingu, Nadee hingu are few among them which are widely employed in the treatment of various diseases. In Sanskrit literature the etymological derivation of word Niryasa is

'Niryasyate vrikshat pravahee rasa rupena bahiniryasyate yo vrikshoshmana'

Niryasa is that which oozes out in the form of semi liquid gummy material from various parts of the plant body by the influence of inner heat of the tree. Gums are un-organized pathological products and are produced when the plant is growing under un-favorable conditions or is injured. Thus they are the abnormal products of plant metabolism. They are considered as decomposition products of cellulose and produced by the conversion of the cell walls into gum (gummosis) by the activation of an enzyme. Gums are amorphous, translucent solids, insoluble in alcohol and in most organic solvents, they are however soluble in water to yield viscous adhesive solutions, or are swollen by the absorption of water into a jelly like mass. Gums are pharmaceutically important poly saccharide derivatives, consisting of calcium potassium and magnesium salts of complex substances known as polyuronides. On prolonged boiling with dilute acids, they yield mixture of sugars and uronic acids. The collection of gums in India does not receive proper attention as it is in the hands of ignorant, illiterate tribal people. The crude material consisting of a mixture of various gums reaches Bombay market from all parts of the country, especially from the Deccan and western regions for marketing. Different market samples of the exudates show divergent features and qualities which directly afflicts the quality of the finished product[1]. In the current scenario of global acceptance of Ayurvedic medicines, it is of paramount important to secure the quality control of herbal crude drugs and their bio-constituents in maintaining good quality and efficacy in finished products and justifying their acceptability by the consumer. As per Good Manufacturing Practices (GMP) the correct determination of the authentic drug as well as its adulterants is mandatory in the current drug industry[2]. In order to establish the correct identity and standards of a drug it is essential to collect detailed information and set the parameters by multi dimensional approach viz, pharmacognostical, phytochemical, experimental, clinical and so on. With the advent of new analytical tools and sophisticated instrumental technology now it is possible to suggest a practicable rigid quality assurance profiles for herbal raw materials and their constituents[3,4]. In the current study market samples of Babbula, along with its original sample collected from plant species, were subjected to organoleptic, physico-chemical and chromatographic evaluation at SDM center for research in Ayurveda and allied sciences, Udupi, India to determine their identity, purity.

Objectives of the Study

- Study of four samples of Babboola niryasa (*Acacia arabica*) with reference to their Physico analytical characters.
- Chromatographic profiling of four samples to determine constituents.

MATERIALS AND METHODS

Market samples of Babboola niryasa i.e. gum exudates from the bark of *Acacia arabica* were collected from three different raw drug traders viz Bangalore, Trissore and Chennai, India. The sample from Bangalore, India was named as Sample 1, from Trissore as Sample 2, and that from Chennai, India as Sample 3.

The original sample was collected by tapping the stem bark of the mature tree of *Acacia arabica* belonging to Mimoceaceae and named as Sample 4.

Organoleptic and Physico analytical study

The samples were subjected to organoleptic examinations, the characters like appearance size colour, odor, taste etc were noted. The samples are subjected to physico analytical study to determine, loss on drying (LOD), total ash, acid insoluble ash and extractive values. Four extracts of each sample viz aqueous, ethanol, chloroform and pet ether are prepared and subjected to Preliminary phyto-chemical screening for detection of constituents at phyto chemistry lab of SDM Center for Research in Ayurveda and allied sciences, Udupi, India.[5,6]

HPTLC

0.5 g of powdered sample hydrolyzed with 10 ml of 7 % sulphuric acid and 3 µl of the extract used for HPTLC. The plates are developed in Ethyl acetate: *n*-propanol: Acetic acid: Water (4:2:2:1). The developed plates are visualized in UV 254 nm, 366 nm and after derivatisation with vanillin-sulphuric acid and scanned under UV 254 nm and 366 nm. R_f, colour of the spots and densitometric scan are recorded.[7]

Observations and Results
Organoleptic features
Babboola niryasa Sample 1 (S-1)

The first sample of Babboola niryasa collected from Bangalore, India (Amrit Kesari Depot, Mamul pet, Avenue Rd, K.R. market) was reddish brown colored larger pieces of rounded or ovoid tears; each tear is about a centimeter in size, having agreeable odor and bland sweet astringent taste. The sample was free from extraneous materials and other impurities. On pounding pieces were broken down easily yielding a fine whitish yellow powder. On triturating with warm water solubility was observed to give dull brownish red thin emulsion which had sweet astringent taste.

Babboola niryasa Sample 2 (S-2)

The second sample of Babboola niryasa procured from Kerala, India (Market Rd, Trissore) was found as dark brownish colored irregular smaller pieces of gum exudates with glistening surface. It was stickier aggregated to form larger lumps of gummy material. The odor was similar to that of Sample 1, but it was mixed with little amount of physical impurities. On pounding it yielded a brownish cream colored powder and when triturated with water gave dull brownish gummy emulsion with faint astringent taste.

Babboola niryasa Sample 3 (S-3)

The third sample of Babboola niryasa procured from Chennai, India (Car Street, Murugan temple, near Broad way) was found as yellowish white colored irregular larger masses of exudates with crystalline appearance. The odor was dull balsamic. But it was mixed with physical impurities. When triturated with warm water gave thin colorless emulsion with bland sweet taste.

Babboola niryasa Sample 4 (S-4)

The fourth sample of Babboola niryasa (original sample) was obtained by tapping the tree *Acacia nilotica* belonging to Mimociaceae family in Ballary, by making linear incisions on the stem bark through the cork cambium up to sap wood. The yellowish brown gum started to ooze out in recognizable quantity from the incisions in 2-3 days. Initially it was dens liquid, soft consistency with shiny cream yellow color and good odor. Gradually it started coagulating and became sticky rounded or irregular masses with dark brownish red color. On pounding it did not get powder instead sticking to the mortar. On triturating with water it completely dissolved to give a brownish red thick viscous gummy suspension with no sediment at the bottom.

DISCUSSION
Organoleptic evaluation

The sample of Babboola niryasa collected from Bangalore, India was reddish brown colored larger pieces of rounded or ovoid tears; each tear is about a centimeter in size, having agreeable odor and bland sweet astringent taste. The sample was free from extraneous materials and other impurities. On pounding pieces were broken down easily yielding a fine whitish yellow powder. On triturating with water complete solubility was observed to give dull brownish red thin emulsion which had sweet astringent taste. The sample of Kerala, India was found as dark brownish colored irregular smaller pieces of gum exudates with glistening surface. It was more sticky and aggregated to form larger lumps of gummy material. The odor was similar to that of Bangalore, India sample, but it was mixed with little amount of physical impurities. On pounding it yielded a brownish cream colored powder and when triturated with water gave dull brownish gummy emulsion with faint astringent taste. The sample of Babboola niryasa procured from Chennai, India was found as yellowish white colored irregular larger masses of exudates with crystalline appearance. The odor was dull balsamic. When triturated with water gave thin colorless emulsion with bland sweet taste. The organoleptic features observed did not match with those of the original sample obtained by tapping the tree *Acacia nilotica* belonging to Mimociaceae family. Original sample was sticky rounded or irregular masses with dark brownish red color. On pounding it did not get powder form instead sticking to the mortar. On triturating with water it completely dissolved to give a brownish red thick viscous gummy suspension with no sediment at the bottom. The sample had agreeable balsamic odor and sweet astringent taste (Table 1).

Analytical study

The drug values obtained from four samples during physicochemical analysis revealed the fact that original sample and the Bangalore, India samples showed the values which are almost equivalent to reference standards given in Quality Standards of I.M.P[6], where as the Chennai, India sample showed totally different values which does not match with ref values (Table 2). The preliminary phyto chemical screening of different extracts of Babboola samples revealed the presence of tannins, starch, and carbohydrates in the form of gum (Table 2 and 3).

HPTLC

On HPTLC of the four samples it is found that, at 254 nm UV range three green colored spots and at UV 366 range blue and faint violet colored bands are commonly noted in all the four samples at R_f 0.10, 0.71 and 0.98; which denotes the symmetry of the samples (Figure 2). After derivatization with vanillin sulphuric acid two brown coloured bands are detected common to all samples at same R_f position viz 0.04 and 0.16. The original sample showed a yellow color band at R_f 0.24 which is not found in rest of the samples. The Bangalore and Kerala, India samples showed common violet band at R_f 0.27 and they are absent in rest two samples. At R_f 0.49 violet bands are noted in three samples except Chennai sample which showed brown spot. HPTLC densitometry scan showed the chromatogram with peaks of different heights at same R_f position under 254, and

366 nm (Figure 2) which indicates presence of similar constituents in graded concentrations. The Chennai sample showed different pattern of bands and peaks and by this observation we can infer that this sample might be from other subspecies of acacia genus or that adulterants might have been added which have altered the chemical profile of the drug.

Table 1: Features of four samples of Babboola niryasa observed

Features	Sample 1 (Bangalore)	Sample 2 (Kerala)	Sample 3 (Chennai)	Sample 4 (original)
Appearance	Rounded / ovoid larger tears, powdered on pounding	Irregular smaller pieces gummy, sticky mass, glistening	Irregular larger pieces crystalline, gummy sticky	Irregular large lumps of gummy sticky mass shiny surface.
Impurities	Absent	Traces	Physical impurities,	Absent
Color	Reddish brown	Brownish red	Yellowish dull cream	Dark brownish red.
Aqueous suspension	Brown	Brownish red	Dull white turbid	Clear reddish brown
Odor	Agreeable balsamic	Agreeable balsamic	Dull balsamic	Agreeable balsamic
Taste	Bland sweet	Sweet astringent	Bland	Sweet, astringent

Table 2: Physicochemical parameters of Babbula

Parameter	Sample 1 Bangalore	Sample 2 Kerala	Sample 3 Chennai	Sample 4 Original	Ref .val.
Loss on drying	12.94	14.60	15.67	11.32	nmt 13 %
Total ash	2.14	2.63	2.87	2.06	nmt 2.6 %
Acid insoluble ash	0.149	0.448	1.34	0.127	nmt 1.4 %
Water soluble extractive	82.8	76	50.81	84.74	nlt 80 %
Alcohol soluble extractive	0.124	0.117	0.116	0.185	nlt 0.3 %

Table 3: Qualitative phytochemicals analysis of exudates

	Test	Babbula 1				Babbula 2				Babbula 3				Babbula 4			
		a	e	p	c	a	e	p	c	a	e	p	c	a	e	p	c
1.Test for Protein	a) Biuret test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	b) Ninhydrin ,,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	c) Sulphur ,,	-	+	-	-	-	+	-	-	-	+	-	-	-	+	-	-
2. Test for Carbohydrates	a) Iodine test	+	-	-	-	+	-	-	-	+	-	-	-	+	-	-	-
	b) Fehlings ,,	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	c) Benedict ,,	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3. Test for Tannins-	a) $FeCl_3$ test	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	b) Gelatin ,,	+	-	+	+	+	-	+	+	+	-	+	+	+	-	+	+
4. Test for Saponin	Foam test	+	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-
5. Test for Anthocyanins	a) Aq NaOH test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	b) Conc.H_2SO_4 ,,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Test for Glycosides	a) Molischs test	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+
	b) Conc.H_2SO_4 ,,	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+
7. Test for Flavanoids	a) Mg. turnings tst	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+
	b) Conc.H_2SO_4 ,,	+	-	-	+	+	-	-	+	+	-	-	+	+	-	-	+
8. Test for Steroids	Salkowskis test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9. Test for Alkaloids	a) Mayers test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	b) Dragendrofs ,,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10. Test for fat and oil		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11. gum and mucilage		+	-	-	-	+	-	-	-	+	-	-	-	+	-	-	-

a Aqueous extract ; **e** Ethanol extract ; **p** Pet ether extract ; **c** Chloroform extract

Table 4: R_f values of all the tracks at 254 nm

Sample 1 Bangalore	Sample 2 Kerala	Sample 3 Chennai	Sample 4 Original
0.10 D green	0.10 D green	0.10 D green	0.10 D green
0.20 L green	0.20 L green	0.20 L green	0.20 L green
0.69 L green	0.69 L green	0.69 L green	0.69 L green

Table 5: R_f values of all the tracks at 366 nm

Sample 1 Bangalore	Sample 2 Kerala	Sample 3 Chennai	Sample 4 Original
0.10 F violet	0.10 F violet	0.10 F violet	0.10 F violet
0.71 F blue	0.71 F blue	0.71 F blue	0.71 F blue
0.98 F blue	0.98 F blue	0.98 F blue	0.98 F blue

Table 6: R_f values of all the tracks after derivastisation

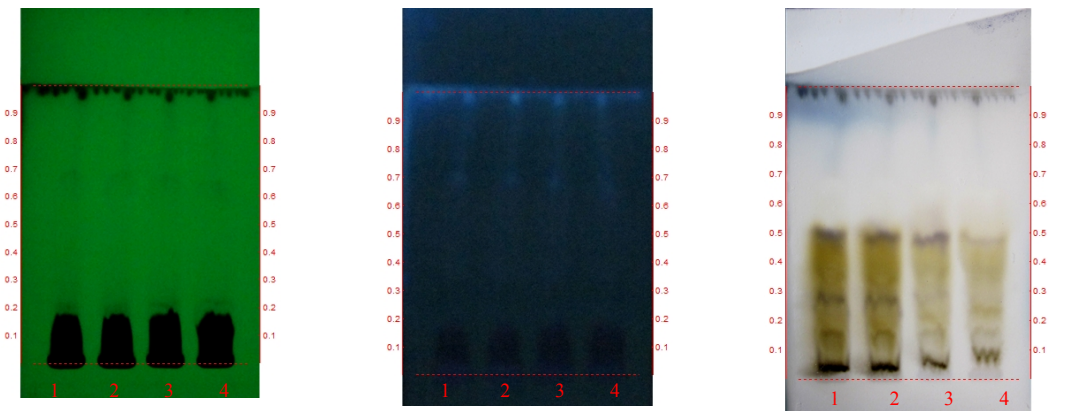
Sample 1 Bangalore	Sample 2 Kerala	Sample 3 Chennai	Sample 4 Original
0.04 D brown	0.04 D brown	0.04 D brown	0.04 D brown
0.16 Brown	0.16 Brown	0.16 Brown	0.16 Brown
--	--	--	0.24 L yellow
0.27 Violet	0.27 Violet	--	0.27 violet
0.49 Violet	0.49 Violet	0.49 L brown	0.49 violet

Table 7: Comparison of the Maximum height Peaks (R_f values) at 254 nm

S. No.	Sample 1	Sample 2	Sample 3	Sample 4
1	0.04	0.04	0.04	0.04
2	0.06	0.06	0.08	-
3	0.13	0.16	0.15	0.14
4	0.22	0.22	0.22	0.22
5	0.26	0.25	0.26	0.27
6	0.42	0.41	0.39	0.41
7	-	-	-	0.51
8	0.79	0.78	0.77	0.79

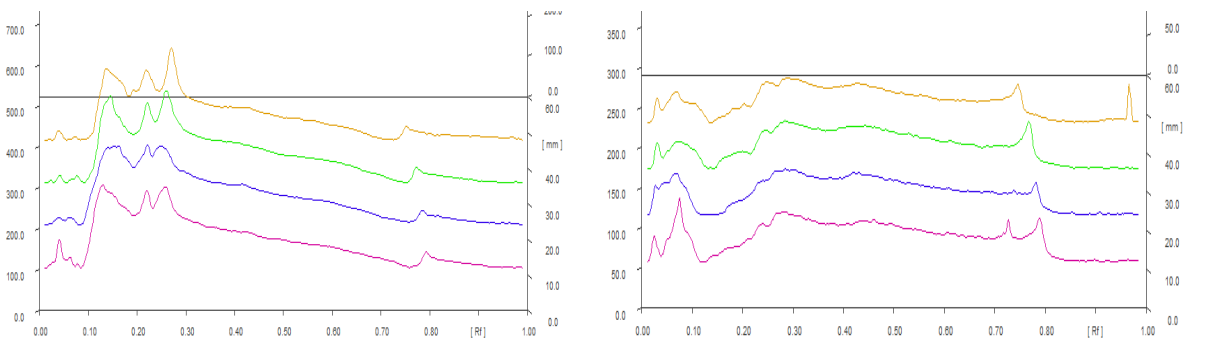
Table 8: Comparison of the Maximum height Peaks (R_f values) at 366 nm

S. No.	Sample 1	Sample 2	Sample 3	Sample 4
1	0.02	-	0.03	0.03
2	0.08	0.07	0.07	0.07
3	-	-	0.20	0.20
4	0.24	-	0.25	0.25
5	0.28	0.29	0.28	0.29
6	0.49	-	-	0.48
7	0.73	-	-	-
8	0.79	0.78	0.77	0.75



At 254 nm **At 366 nm** **Post derivatisation**

Figure 1: TLC photo documentation of Babbula
Solvent system: Ethyl acetate: Isopropanol: Acetic acid: Water (4:2:2:1)



At 254 nm **At 366 nm**

Figure 2: 3 D display of all the tracks

Sample 1

Sample 2

Sample 3

Sample 4

CONCLUSION

The values obtained from four samples during physicochemical analysis revealed the graded standards and purity of the samples. It was observed that the original sample and the Bangalore samples showed the values which are almost equivalent to reference standards given in Quality Standards of I.M.P. volume 5, page 8 (Table 2). The Chennai sample showed different pattern of bands and peaks and by this observation we can infer that this sample might be from other subspecies of acacia genus or that adulterants might have been added which have altered the chemical profile of the drug.

REFERENCES

1. Ramanathan *et al* ,Wealth of India, A dictionary of Indian raw materials and industrial production, National Institute of Science, Council of Scientific and Industrial Research, edition, Vol I; 1999. p. 4.
2. Dr CK Kokate *et al*, Pharmacognosy, Nirali Prakashan, Pune, 19th edition; p. 97.
3. Prof GS Lavekar *et al*. Database on Medicinal Plants used in Ayurveda and Sidda C.C.R.A.S., AYUSH, New Delhi, volume I. p. 57.
4. Anonymous, Reviews on Indian Medicinal Plants, Medicinal Plants Unit, Indian Council of Medical Research, ICMR New Delhi 2011; vol I. p. 53-94.
5. Anonymous, Parameters for Qualitative analysis of Ayurveda and Siddha drugs, CCRAS New Delhi, edition, part A; 2005. p. 187.
6. Neeraj Tandan *et al*. Quality Standards of Indian Medicinal Plants; Medicinal Plants Unit, Indian Council of Medical Research, ICMR New Delhi; vol V; 2012. p. 8, vol IX; 2012. p. 10.
7. Stahl E. A Laboratory Hand book of Thin Layer Chromatography, Springer Verlag Berlin, 2nd edition; 2005. p. 147.

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