

Quality Evaluation of Ingredients of 'Trifala' Churna (*Phyllanthus emblica* L., *Terminalia bellirica* Roxb. and *Terminalia chebula* Retz.) Resourced from Commercial Sources

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Abstract

Commercial samples of herbal ingredients of a popular classical preparation 'Trifala Churna', *Phyllanthus emblica* L. (Amla), *Terminalia bellirica* Roxb. (Bahera) and *Terminalia chebula* Retz. (Harad) were evaluated to assess their quality in respect of identity, purity and strength. The raw samples of herbal drugs were resourced from Delhi, Hardwar and Cochin markets. Evaluation is based on specific parameters and limits developed by standardising authentic samples of drugs.

Keywords: Pharmacognostic evaluations, Commercial herbal drugs, Quality assessment.

Introduction

Raw drugs used by the industries for the preparation of classical formulations of Ayurvedic, Unani and Shiddha system of medicines are mostly resourced from the wild or cultivation sources. It is estimated that about 800 species are used in production by the pharmaceutical industry, whereas less than 40 species of plants are resourced through commercial cultivation. Over 70% of the plant collection involves destructive harvesting. The raw drugs collected from wild sources remain questionable for their quality especially when they have been procured from trade channels owing to fair chances of adulteration, substitution and inappropriate storage conditions which lead to deterioration in quality (Padmakumar *et al.*, 2012 a,b,c,d; Rai *et al.*, 2011, 2012a,b).

'Trifala' churna is one the most important classical formulation which is recommended as a mild laxative, which cleanses and tonifies the gastrointestinal tract. The main ingredients of Trifala churna are the dried fruits of *Phyllanthus emblica* L., *Terminalia bellirica* Roxb. and *Terminalia chebula* Retz. in equal proportion. Drugs industries procure the raw drug material from the herbal drug markets. All the raw drugs which are available in dried form in the market are always subject to quality check in a laboratory on the basis of pharmacognostical, physico-chemical, phyto-chemical, microbiological and other analytical specifications. Present communication deals with the pharmacognostical, physico-chemical and phyto-chemical evolution of the market samples of *Phyllanthus emblica* L., *Terminalia bellirica* Roxb. and *Terminalia chebula* Retz. which are by and large procured from the three major herbal markets, namely, Delhi, Hardwar and Cochin. This communication will be very helpful for the herbal industry for setting their in-house parameters and testing of the raw ingredients of 'Trifala' churna.

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Materials and Methods

The raw drugs under study were collected from natural habitats and authenticated with reference to pharmacopoeial standards and other literature. The commercial samples sold under the trade names purported to be prescribed species were drawn from the different market sources (Hardwar, Delhi and Cochin/Trichur). Standard protocols/methods prescribed in pharmacopoeia were followed for pharmacognostical, physico-chemical and phytochemical values. The specification laid down in Ayurvedic, Unani and Siddha Pharmacopoeia of India were considered to evaluate the quality of the commercial samples (Anonymous, 1986, 1998, 1999, 2007a,b and 2008).

Table 1: Commercial Herbal Drugs under Study

Botanical Name	Official Name	Trade Name	Morphological Part
<i>Phyllanthus emblica</i> L.	Amlaki	Amla	Fruit
<i>Terminalia bellirica</i> Roxb.	Bibhitaka	Bahera	Fruit
<i>Terminalia chebula</i> Retz.	Haritaki	Harad	Fruit

Observations and Results

All the commercial samples of the drugs were evaluated as per the specifications laid in Pharmacopoeia and other literature. Observations made are given in Table 2 to 4.

Table 2. Pharmacognostical Evaluation of Commercial Crude Drug Samples of *Phyllanthus emblica* L.

Sl. No.	Specifications	Market Sample		
		Delhi	Hardwar	Cochin
A.	Entire Drug	Conforms	Conforms	Conforms
	1. Macromorphological characteristics			
	2. Micromorphological characteristics	Conforms	Conforms	Conforms
B.	Powdered drug	Conforms	Conforms	Conforms
C.	Major organic groups			
	(i) Alkaloids	-	-	-
	(ii) Tannins	√	√	√
	(iii) Glycosides	-	-	-
	(iv) Sterols	-	-	-
	(v) Volatile oil	-	-	-
	(vi) Flavonoids	-	-	-
	(vii) Anthraquinone	-	-	-
	(viii) Resins	-	-	-
	(ix) Fixed oil	-	-	-
(x) Poly phenolic compounds	-	-	-	

D.	Physico-Chemical characteristics			
	(i) Moisture Content %	22.56	32.78	0.56
	(ii) Total ash %	5.20	6.60	7.65
	(iii) Acid insoluble ash %	1.80	1.32	0.80
	(iv) Water soluble extractives	59.00	52.50	49.34
	(v) Alcohol soluble extractives %	43.50	45.00	38.00
E.	Foreign matter %	3.20	3.90	2.24

Table 3. Pharmacognostical Evaluation of Commercial Crude Drug Samples of *Terminalia bellirica* Roxb.

Sl. No.	Specifications	Market Sample		
		Delhi	Hardwar	Cochin
A.	Entire Drug			
	1. Macromorphological characteristics	Conforms	Conforms	Not conforming
	2. Micromorphological characteristics	Slightly varies	Conforms	Slightly varies
B.	Powdered drug	Conforms	Conforms	Conforms
C.	Major organic groups			
	(i) Alkaloids	-	-	-
	(ii) Tannins	√	√	√
	(iii) Glycosides	-	-	-
	(iv) Sterols	-	-	-
	(v) Volatile Oil	-	-	-
	(vi) Flavonoids	-	√	-
	(vii) Anthraquinone	√	√	-
	(viii) Resins	-	-	-
	(ix) Fixed oil	-	-	-
(x) Poly phenolic compounds	-	-	-	
D.	Physico-chemical characteristics	5.60	3.80	2.56
	(i) Moisture content %	3.50	2.95	4.10
	(ii) Total ash %	0.95	0.50	0.75
	(iii) Acid insoluble ash %	37.00	40.10	38.20
	(iv) Water soluble extractives	8.50	9.20	8.80
	(v) Alcohol soluble extractives %			
E.	Foreign matter %	0.85	0.98	1.25

Table 4. Pharmacognostical Evaluation of Commercial Crude Drug Samples of *Terminalia chebula* Retz.

Sl. No.	Specifications	Market Sample		
		Delhi	Hardwar	Cochin
A.	Entire Drug			
	1. Macromorphological characteristics	Conforms	Conforms	Conforms
	2. Micromorphological characteristics	Conforms	Conforms	Conforms
B.	Powdered drug	Conforms	Conforms	Conforms
C.	Major organic groups			
	(i) Alkaloids	-	-	-
	(ii) Tannins	√	√	√
	(iii) Glycosides	-	-	-
	(iv) Sterols	-	-	-
	(v) Volatile Oil	-	-	-
	(vi) Flavonoids	-	-	-
	(vii) Anthraquinone	-	√	√
	(viii) Resins	-	-	-
	(ix) Fixed oil	-	-	-
(x) Poly phenolic compounds	√	√	√	
D.	Physico-Chemical Characteristics	5.60	2.80	3.50
	(i) Moisture Content %	3.50	3.20	4.15
	(ii) Total ash %	0.15	1.60	2.10
	(iii) Acid insoluble ash %	64.15	52.00	58.20
	(iv) Water soluble extractives	44.95	42.55	40.55
	(v) Alcohol soluble extractives %			
E.	Foreign Matter %	2.20	Nil	1.25

Discussion and Conclusion

Pharmaco-botanical evaluation of three ingredients of Trifala churna viz. *Phyllanthus emblica* L., *Terminalia bellirica* Roxb. and *Terminalia chebula* Retz. were procured from three different market sources and compared with the genuine and authenticated crude drug samples as well with pharmacopoeial standards. Each plant drug is discussed in detail as below:

Fresh and dried fruits of *Phyllanthus emblica* L. (Fig. 1) are used as drug in various preparations of Ayurveda and Unani system; dried mature fruits are available in the market, either as whole ones or as curled pieces; micro

morphologically, it shows ramified vascular elements, stone cells either isolated or in small groups and pitted vascular fibres; powder shows isodiametric parenchyma cells with irregular thickened walls, occasionally short fibres and trachieds; major chemical constituents are Ascorbic Acid and Tannin. All the collected commercial samples conform to the authentic sample. Moisture content varies from 0.56% to 32.78%. *Terminalia bellirica* Roxb. (Fig. 2) is available as dried fruit with the name of Baheda which is nearly spherical to ovoid in shape and grey to greyish brown in colour with slightly wrinkled appearance; most of the mesocarp cells contains simple starch grains and some stone cells; rosette crystals of calcium oxalate and stone cells present in the parenchymatous cells; active chemical constituents are tannins; micro morphological characteristics of Delhi and Cochin sample slightly varies; physico-chemical characteristics and macro morphological characteristics of all the samples conform to that of the genuine authenticated sample. Haridwar sample perfectly conforms to the authenticated sample. Foreign matter content varies from 0.85% to 1.25%. *Terminalia chebula* Retz. (Fig. 3) is available as dried fruit in the market with the name of Harad, yellowish brown in colour, wrinkled and ribbed longitudinally; tannins and raphides are present in parenchyma; endocarp consists of thick walled sclerides of various shapes and sizes; starch grains simple rounded or oval in shape; powder brownish in colour with occasional crystals of calcium oxalate are also seen; active chemical constituents are Tannins, Polyphenolic compounds etc. All the collected samples perfectly conform to that of the authentic sample. Haridwar sample was perfectly devoid of foreign matter.

The present study reveals that commercial samples are always subject to quality control for their authenticity to ensure identity, purity and strength as per pharmacopoeial and other quality standards before their use to formulate the medicine. This quality evaluation practice may also ensure the safety and efficacy of medicine up to larger extent.



Fig. 1: Macro-morphological features of dried fruit of *Phyllanthus emblica* L.



Fig. 2: Macro-morphological features of dried fruit of *Phyllanthus emblica* L.



Fig. 1: Macro-morphological features of dried fruit of *Phyllanthus emblica* L.

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