Pharmacognostic evaluation of Herbal Drugs of Stem Origin Resourced from Market

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Abstract

Market samples of three stem origin herbal drugs viz. *Cinnamomum verum* Presl., *Terminalia arjuna* (Roxb. ex DC) W. & A. and *Piper longum* L. were studied to assess their quality in respect of identity, purity and strength. The samples were procured from herbal markets of Delhi, Hardwar and Cochin/Trichur. Study is based on specific parameters and limits developed by standardising authentic quality specification.

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

Introduction

Herbs are staging a comeback and herbal 'renaissance' is in place all over the globe. The herbal products today symbolise safety in contrast to the synthetics that are regarded as unsafe to human and environment. Over three-quarters of the world population relies mainly on plants and plant extracts for health care. More than 30% of the entire plant species, at one time or other, were used for medicinal purposes. The drugs of herbal origin have been used in traditional systems of medicines such as *Ayurveda*, *Siddha* and *Unani*. Even the modern system of medicine has also adopted a number of plant-derived drugs. Some important chemical intermediates needed for manufacturing the modern drugs are also obtained from plants.

The World Health Organization (WHO) has estimated that the present demand for medicinal plants is approximately US $14 billion per year (Sharma, 2004). The demand for medicinal plant-based raw materials is growing at the rate of 15 to 25% annually, and according to an estimate of WHO, the demand for medicinal plants is likely to increase more than US $5 trillion by 2050. In India, the medicinal plant related trade is estimated to be approximately US $1 billion per year (Joshi et al., 2004). India's potential in market for medicinal and aromatic plants (MAPs) is evident with the facts that the MAPs required to prepare 50 per cent of the drugs mentioned in British Pharmacopoeia are reported to be present in Western Himalayan region alone. Further, this region caters to about 80 per cent of *Ayurvedic*, 46 per cent of *Unani* and 33 per cent of allopathic system of medicines and contributes a major share to the economy of the rural farmers and tribals (Singh, 2006).

Herbal drugs used by the industries are collected from the wild resources. 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

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commercial cultivation. Over 70% of the plant collection involves destructive harvesting. This poses a definite threat to the genetic stocks and to the diversity of medicinal plants. Adulterants/substitutes are being traded/used with at times with full knowledge of the sellers/buyers and are very common in the herb trade especially when the trade is involved. In many cases, substitutes have taken over the original plants. In some cases, substitutes have become popular, manufacturers have forgotten about the original plant and they only use substitutes available in the market. It is very much doubtful if such substitution is made after testing or as recommended by any authority. Sometimes different morphological parts of same plant species are used in place of the prescribed part. At times mere look alike species are used as a substitute, which may not even contain the active ingredients available through the main plants nor the effects of the end product is the same as that obtained from that of original plant (Sharma, 1987; Rai *et al.,* 2011 and Padmakumar *et al.,* 2012). Based on this rational the present study has been taken and deals with three important herbal drugs widely used in Indian systems of medicine for centuries.

Materials and Methods

The stem and stem bark origin herbal drugs under study were collected from natural habitats and authenticated with references to pharmacopoeial standards and other literature. The commercial samples sold under the trade names purported to be prescribed species were obtained from different market sources (Hardwar, Delhi and Cochin/Trichur) (Fig. 1-3). Standard protocols/ methods prescribed in pharmacopoeia were followed for pharmacognostical, physico-chemical and phytochemical values prescribed in Ayurvedic, Unani and Siddha Pharmacopoeia of India were taken as standards values (Anonymous, 1986, 1998, 1999, 2007a,b and 2008).

Table 1: Commercial Herbal Drugs under study

Botanical Name	Official Name	Trade Name	Morphological Part
Cinnamomum verum Presl.	Twak	Dalchini	Stem bark
Terminalia arjuna (Roxb. ex DC) W. & A.	Arjuna	Arjun chal	Stem bark
Piper longum L.	Pippalimula	Pippali	Stem

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 *Cinnamomum verum* Presl.

Sl. No.	Specifications		Market Sample		
			Delhi	Haridwar	Cochin
A.	Entire Drug 1. Macromorphological characteristics		Conforms	Conforms	Conforms
	2. Micromorphological characteristics				
B.	Powdered drug		Conforms	Conforms	Conforms
C.	Major organic groups				
	(i)	Alkaloids	-	-	-
	(ii)	Tannins	√	√	√
	(iii)	Glycosides	-	-	-
	(iv)	Sterols	-	-	-
	(v)	Volatile Oil	√	-	√
	(vi)	Essential Oils	√	-	√
	(vii)	Flavonoids	-	-	-
	(viii)	Anthraquinone	-	-	-
	(ix)	Resins	-	-	-
	(x)	Fixed oil	-	-	-
	(xi)	Poly phenolic compounds	-	-	-
D.	Physico-Chemical Characteristics				
	(i)	Moisture Content %	4.60	3.95	5.25
	(ii)	Total ash %	2.50	3.28	2.20
	(iii)	Acid insoluble ash %	1.60	1.20	0.90
	(iv)	Water soluble extractives	4.10	4.50	4.80
	(v)	Alcohol soluble extractives %	3.20	5.42	5.90
E.	Foreign Matter %		0.55	1.20	1.60

Table 3: Pharmacognostical evaluation of commercial crude drug samples of *Terminalia arjuna* (Roxb. ex DC) W. & A.

Sl. No.	Specifications		Market Sample		
			Delhi	Haridwar	Cochin
A.	Entire Drug 1. Macromorphological characteristics		Conforms	Conforms	Varies slightly
	2. Micromorphological characteristics		Conforms	Conforms	Conforms
B.	Powdered drug		Conforms	Conforms	Conforms
C.	Major organic groups				
	(i)	Alkaloids	-	-	-
	(ii)	Tannins	√	√	√
	(iii)	Glycosides	-	-	√
	(iv)	Sterols	-	-	-

	Specifications			
	(v) Volatile Oil	-	-	-
	(vi) Flavonoids	-	-	-
	(vii) Anthraquinone	-	-	-
	(viii) Resins	-	-	-
	(ix) Fixed oil	-	-	-
	(x) Poly phenolic compounds	√	√	√
D.	Physico-Chemical Characteristics			
	(i) Moisture Content %	6.50	4.56	4.25
	(ii) Total ash %	12.50	11.90	21.30
	(iii) Acid insoluble ash %	0.80	0.21	0.54
	(iv) Water soluble extractives	22.10	20.80	23.20
	(v) Alcohol soluble extractives %	20.13	19.20	27.80
E.	Foreign Matter %	1.08	1.20	0.95

Table 4: Pharmacognostical evaluation of commercial crude drug samples of *Piper longum* L.

Sl. No.	Specifications	Market Sample		
		Delhi	Haridwar	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			
	(i) Moisture Content %			
	(ii) Total ash %			
	(iii) Acid insoluble ash %			
	(iv) Water soluble extractives%			
	(v) Alcohol soluble extractives%			
E.	Foreign Matter %	1.15	0.80	0.40

Fig. 1: *Cinnamomum* verum Presl.

Fig. 2: *Terminalia arjuna* (Roxb. ex DC) W. & A.

Fig. 3: *Piper longum* L.

Discussion and Conclusion

Dried stem bark of *Cinnamomum v*erum Presl. is sold in the market under the trade name of 'Dalchini' and used in the preparation of various Unani preparations and also used in spices. Bark is brittle and dull yellowish-brown in colour with occasional small scars. It also contains minute acicular crystals of calcium oxalate. Active chemical constituents are Tannin, Essential oil and mucilage. Moisture content varies from 3.95% to 5.25%, alcohol soluble extractives from 3.2% to 5.9% and total ash 2.2% to 3.28%. Foreign matter content varies from 0.55% to 1.60%. All the commercial samples conform to that of authentic drug specimen. Drug available as dried cut stem pieces of *Piper longum* L. which are reddish brown to grey in colour with distinct internodes and swollen nodes with small rootlets and root scars. Starch grains simple and compound having 2 to 7 components, round to oval, present abundantly. Active chemical constituents are alkaloids. All the commercial samples of Delhi, Haridwar and Cochin conforms to the properties of the authentic sample. *Terminalia arjuna* (Roxb. ex DC) W. & A. available as pieces of curved bark, recurved, channelled to half quilled with smooth and grey outer surface and inner surface somewhat fibrous and pinkish with the trade name of 'Arjun chal'. Outer layers of cells filled with brown colouring matter. Phloem

parenchyma contains rosette crystals of calcium oxalate. Starch grains simple and compound of 2 to 3 components round to oval found throughout the tissue. Powder of *Terminalia arjuna* (Roxb. ex DC) W. & A. is reddish-brown in colour with rosette crystals of calcium oxalate, a few rhomboidal crystals and simple and compound starch grains. Active chemical constituents are tannins. All the collected commercial samples conform to the values of authenticated samples. However, the macro-morphological characteristic of Cochin sample slightly varies. Foreign matter content varies from 0.95% to 1.2%.

The present study demonstrates that market samples should always be subjected to quality evalution to ensure identity, purity and strength as per pharmacopoeial specifications and other quality standards of drugs before their use in the formulations.

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