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COMPARATIVE HISTOLOGICAL, HISTOCHEMICAL AND PHYTOCHEMICAL STUDIES OF THE RAW DRUG *JIVANTI* FROM DIFFERENT RAW DRUG MARKETS OF KERALA

T. P. Girija ^{*1} and A. B. Rema Shree ²

Department of Botany ¹, MES Asmabi College, P. Vemballur, Thrissur, Kerala, India.

CMPR, Arya Vaidya sala ², Kottakkal, Malappuram, Kerala, India.

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Correspondence to Author:

Dr. T. P Girija

Assistant Professor
Post Graduate and Research,
Dept. of Botany, MES Asmabi
College, P. Vemballur, Thrissur,
Kerala – 680 671, India.


E- mail: girijamanu@yahoo.in

ABSTRACT: *Jivanti* is considered a stimulant and tonic in Ayurvedic literature. Its medicinal use dates back to about 4500 to 1600 BC, as mentioned in classical texts. *Holostemma ada-kodien* and *Leptadenia reticulata* are the two plants used in Ayurveda as source plants of the drug *Jivanti*. Roots of these plants are used in several Ayurvedic preparations. Though Ayurvedic Formulary of India mentions *Leptadenia reticulata* as the source plant of *Jivanti*, throughout Kerala and mostly in South India, *Holostemma ada-kodien* is used as source plants of *Jivanti* and there are reports regarding adulteration in market samples, which will adversely affect the quality of medicines prepared. Till now there is no significant study to compare the source plants available in markets as *Jivanti*. Present work is a comparative histological, histochemical and phytochemical study of the raw drug *Jivanti* from different raw drug markets of Kerala. This is a first time approach to develop quality control measures with the help of histological, histochemical and phytochemical tools.

INTRODUCTION: *Jivanti*, the drug is considered to have the property to bestow health and liveliness to the consumer. *Caraka* treats it as an important *rasayana* drug, capable of maintaining the youthful vigour and strength. The botanical identity of the drug is highly disputed. Kerala physicians identified *Holostemma ada-kodien* as *Jivanti*. The roots of these plants are being used as *Jivanti* in Kerala. Some authors from north have equated it with *Flickingeria nodosa* (Dalz.) Sciden f. an orchid ¹. *Leptadenia reticulata* is considered to be a good cure for tuberculosis and eye diseases.

So it is treated as the real *Jivanti* by some authors ² and Ayurvedic formulary of India also accepts this plant as the true drug ³. The root is the official part, used for the preparations like *Jivantyadi ghrtam*, *Manasamitravatakam*, *Balarishtam* and *Anutailam* etc ⁴. Poisonous affections and tuberculosis are also relieved by the use of the drug ^{4,5}. The adulteration/substitution occurs either due to the non availability of genuine drugs in required quantities or due to the ignorance of the correct identity of the genuine drug. From the present study found that majority of the Kerala market samples are *Holostemma ada-kodien*, the drug source of *Jivanti*. Morphological features of these plants were reported ^{5,6}.

These morphological features are helpful for the identification of these plants. During the adulteration/substitution occurs, the identification of dried or fresh materials available in the markets

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is impossible. So these comparative studies of market samples are helpful for the correct identification of this raw drug. Reports to prove the pharmacological activities of the source plants of *Jivanti* are available.

Tuberous roots of *H. ada-kodien* possess potential anti-diabetic activity⁷, dose dependent scavenging activity against DPPH radicals, Superoxide radicals, and Nitric oxide radicals⁸ and hepatoprotective effect against paracetamol (PCM) induced liver damage in rats⁹. *Leptadenia reticulata* possesses the alterative, aphrodisiac, astringent, Galactogogue, diuretic and used as a tonic in debility due to seminal discharges, also useful in asthma. It is beneficial if used externally in various skin diseases, wounds and inflammation of the skin¹⁰.

MATERIALS AND METHODS:

Holostemma ada-kodien and *Leptadenia reticulata* are the two plants used as a source of *Jivanti*. Both the plants belonging to same family Asclepiadaceae. Trips were conducted to collect the raw drugs from different raw drug markets of Kerala and the materials were subjected to anatomical and chemical comparison using the standard procedure. From this study raw drugs were collected from 12 markets of Kerala (Alappuzha, Calicut, Ernakulam, Idukki, Kollam, Kottayam, Kuttyadi, Malappuram, Palakkad, Thrissur, Vadakara and Wayanad. Roots were fixed in Formalin Acetic acid Alcohol (FAA) mixture for further study.

Histological and histochemical studies:

Histological studies of the useful parts of genuine plants/ substitutes/ market samples were carried out to study the type of cells and other details etc. Histochemical characterization of raw drugs were carried out according to standard procedures¹¹.

Phytochemical studies:

Method of extraction:

Extraction is the first step in the phytochemical evaluation of the plant material. The choice of extraction depends on the nature of the plant material and the compounds to be isolated. Powdered materials with suitable solvent are used for extraction process.

Thin layer Chromatography (TLC) studies: Thin layer chromatographic studies conducted using precoated plates of silica gel 60 F₂₅₄ (E. Merck) of uniform thickness of 0.2 mm.

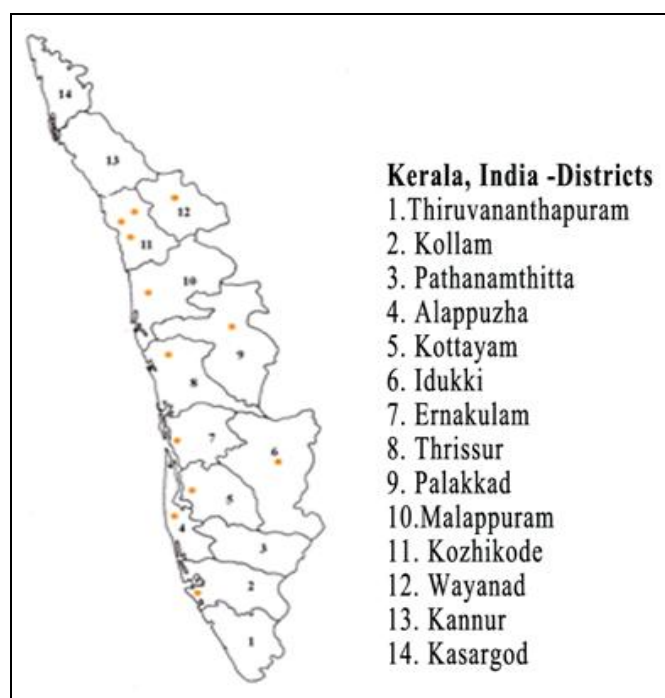


FIG.1: MAP SHOWING THE RAW DRUG MARKETS IN KERALA FROM WHERE THE RAW DRUG SAMPLES *JIVANTI* COLLECTED

RESULT AND DISCUSSION: Materials collected from 12 markets (Fig. 1) of Kerala and studied their pharmacognostical and phytochemical characters. From the study it is confirmed that all materials except Kollam all materials are *H. ada-kodien*. Though there is no variation in the basic anatomical characters of *H. ada-kodien*, anatomical studies of the market samples show differences in the depositions of lignin and starch according to the place of collection. The sample collected from Kollam shows adulteration when compared to anatomical characters of genuine *H. ada-kodien* (Plate 1).

From the thin layer chromatographic profiles developed for the genuine drug and the market samples it is well clear that except the sample from Kollam all the other samples are the genuine *H. ada-kodien* for the drug *Jivanti*. Maximum % was observed in *H. ada-kodien* collected from Idukki, Kottayam, Vadakara and Waynad area. Among the raw drugs sample collected from Kollam showed additional bands at R_f 0.72. Whereas all other drug

showed same R_f values which is detailed in the **Table 1** and **Table 2**. The samples from Kollam

may be an adulterant which was not identified (**Plate 2**).

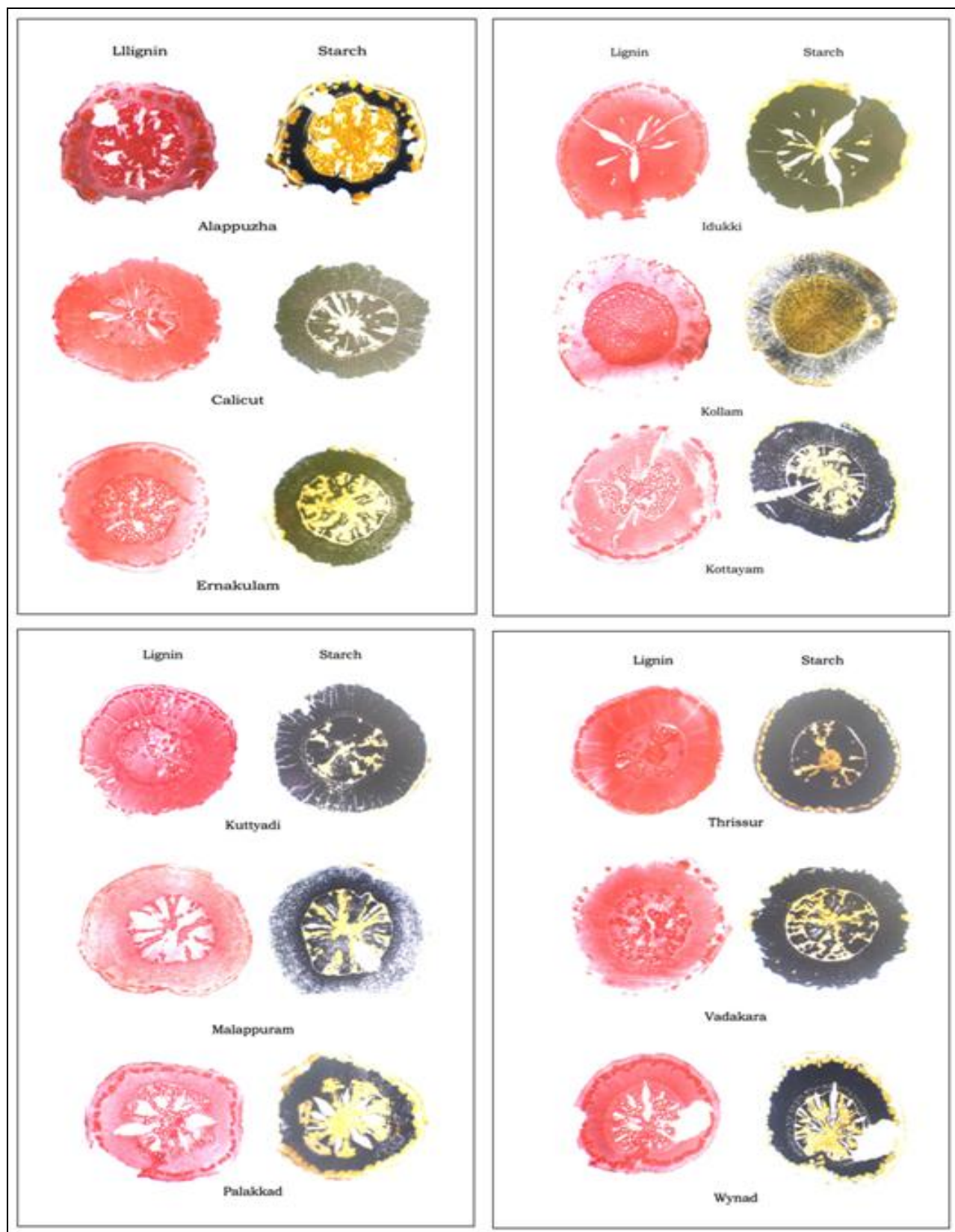


PLATE1: HISTOCHEMICAL COMPARISON OF RAW DRUG SAMPLES OF JIVANTI COLLECTED FROM DIFFERENT RAW DRUG MARKETS OF KERALA

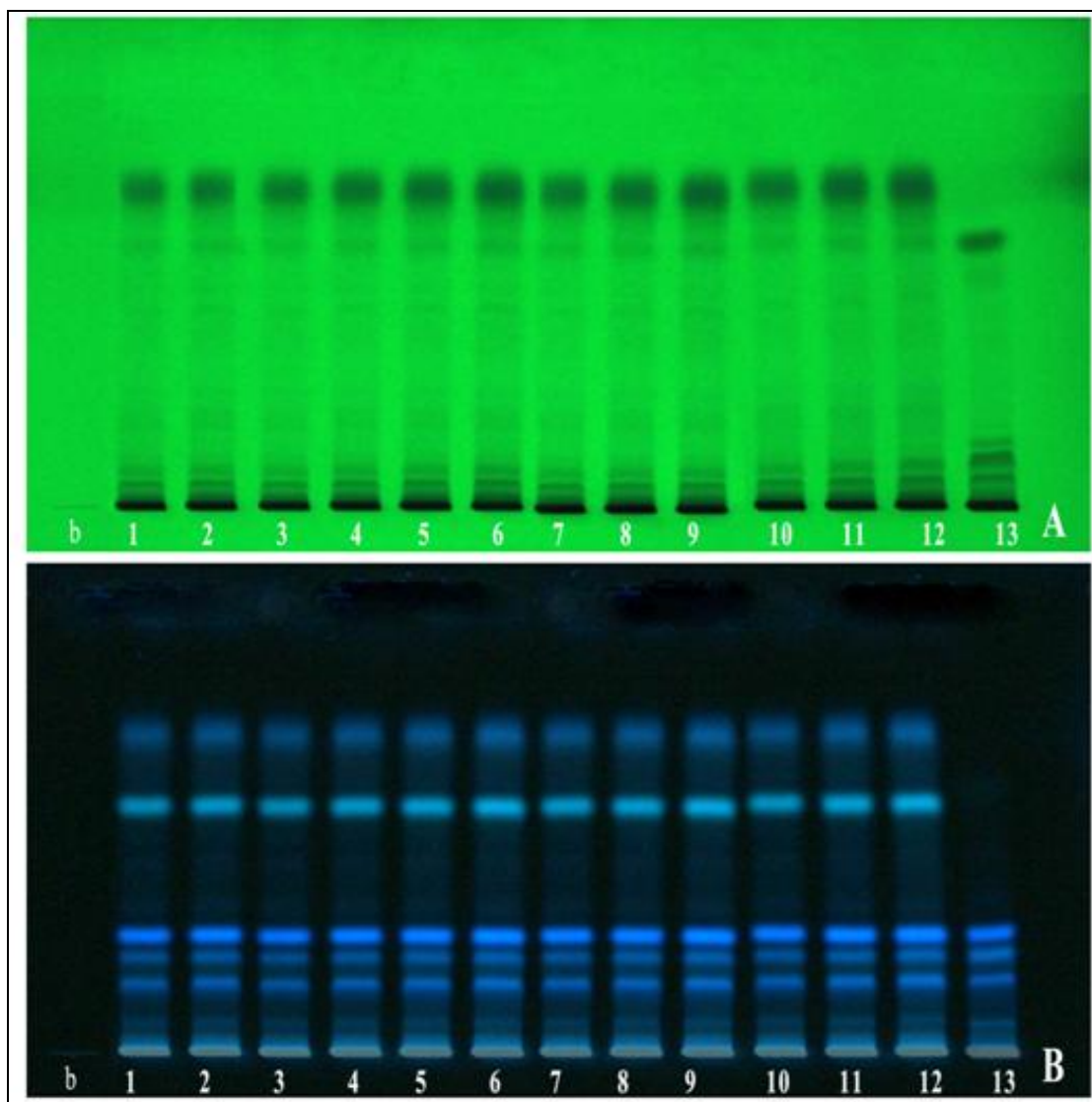


PLATE 2: TLC COMPARISON OF JIVANTI SAMPLES COLLECTED FROM DIFFERENT RAW DRUG MARKETS OF KERALA. A, profile at 254nm. B. Profile at 366nm. b, β -sitosterol. 1. Genuine material; 2. Alappuzha; 3. Calicut; 4. Ernakulam; 5. Iduki; 6. Kottayam; 7. Kuttyadi; 8. Malappuram; 9. Palakkad; 10. Thrissur; 11. Vadakara; 12. Wayanad; 13. Kollam

TABLE 1: R_f VALUES OF DIFFERENT MARKET SAMPLES OF JIVANTI AT 254 nm

Track	R_f values												Colour of the bands	
	ALP	CLT	EKM	IDK	KTM	KDI	MLM	PKD	TSR	VDK	WYD	KLM		
1	0.07	0.07	0.07	0.07	-	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	Grey
2	-	-	-	-	0.08	-	-	-	-	-	-	-	-	Grey
3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Grey
4	-	-	-	-	0.12	-	-	-	-	-	-	-	-	Grey
5	-	-	-	-	0.16	-	-	-	-	-	-	-	-	Grey
6	0.21	0.21	0.21	0.21	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	Grey
7	-	-	-	-	0.39	-	-	-	-	-	-	-	-	Grey
8	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	Grey
9	-	-	-	-	0.54	-	-	-	-	-	-	-	-	Grey
10	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	Grey
11	0.78	0.78	0.78	0.78	-	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	Grey

ALP – Alappuzha IDK – Idukki MLM – Malappuram VDK – Vadakara
 CLT – Calicut KTM – Kottayam PKD – Palakkad WYD – Wynad
 EKM – Ernakulam KDI – Kuttyadi TSR – Thrissur KLM – Kollam

TABLE 2: R_F VALUES OF DIFFERENT MARKET SAMPLES OF JIVANTI AT 366 nm

Track	R _f values												Colour of the bands
	ALP	CLT	EKM	IDK	KTM	KDI	MLM	PKD	TSR	VDK	WYD	KLM	
1	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	Green
2	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	Blue
3	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	Blue
4	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	Blue
5	0.6	0.6	0.6	0.6	-	0.6	0.6	0.6	0.6	0.6	0.6	0.6	Green
6	0.78	0.78	0.78	0.78	-	0.78	0.78	0.78	0.78	0.78	0.78	0.78	Blue

ALP – Alappuzha IDK –Idukki MLM – Malappuram VDK – Vadakara

CLT – Calicut KTM– Kottayam PKD - Palakkad WYD - Wynad

EKM – Ernakulam KDI – Kuttyadi TSR – Thrissur KLM - Kollam

CONCLUSION: To check the extend of variability of source plants of *Jivanti* from different raw drug markets of Kerala, histological, histochemical and phytochemical studies are used. From the present study it is clear that differences were observed in the depositions of lignin and starch according to the place of collection, but the chemical profiling showed that the compounds are similar but a little difference in their concentrations. From the Kerala market survey it was calculated that about 90% of the raw drug *Jivanti* were found to be *Holostemma ada-kodien*, the raw drug sources of *Jivanti* used in Kerala and 10% were found to be adulterant

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