RESEARCH ARTICLE

QUALITY EVALUATION OF THE TRADED RAW DRUG OF *TINOSPORA CORDIFOLIA* (CHITTAMRUTHU) COLLECTED FROM KERALA HERBAL MARKET

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Abstract: *Tinospora cordifolia* (Willd)Miers., is a herbaceous vine of the family Menispermaceae indigenous to tropical regions of the Indian subcontinent. Its uses and application with reference to human benefits have been written in various ayurvedic and vedic scriptures and practices long back. Its common names include Gilo, Moonseed, Chittamrithu etc. *Tinospora cordifolia* is used for diabetes, high cholesterol, allergic rhinitis (hay fever), upset stomach, gout, lymphoma and other cancers, rheumatoid arthritis , hepatitis, peptic ulcer disease , fever, gonorrhea, syphilis, and finally to boost the immune system. It is one of the ingredients of KHADA preparation recommended by Ministry of Ayush for boosting up immunity during Covid -19 pandemic. The rising demand for this drug now has naturally may lead to adulteration inmarket raw drug samples. This paper presents the results of quality evaluation of the raw drug market samples of *Tinospora cordifolia* collected from different herbal markets of Kerala. In the study the thin layer chromatographic profiles of the genuine plant samples were compared withthat of market samples. The TLC profile of the methanol extract of genuine plant material gave specific fingerprint which can be differentiated from spurious samples by cross matching. This method can be effectively utilized for checking of the market samples for ensuring the quality. The study revealed that out of fifty market samples analysed only forty seven were pure and three werespurious.

Keywords: Adulteration, Tinospora, Chittamruthu, Thin layer chromatography (TLC)

INTRODUCTION

Tinospora cordifolia commonly called as Chittamruthu in Malayalam and Giloy in Hindi and Heart leaved moonseed in English , belongs to the family Menispermaceae. Its common names include Gilo, Giloe, Giloya, Guduchi, Tinospora, Gurcha, Heart-Leaved Moonseed, Chittamrithu etc. The whole plant is medicinally useful. Three different species of Tinospora are commonly found in Kerala. They are *Tinospora cordifolia, Tinospora malabarica and Tinospora crispa*. But vaidyas prefer *T.cordifolia* only. It is the major ingredient in many ayurvedic formulations like amritharishtam, amritadikashayam, amrithaprasam, amrithadi-choornam, amrithotharam kashayam, valiya marmagulika etc. The availability of fresh raw drug material is decreasing as cultivation is meagre. Scarcity of genuine materials from wild and practically no cultivation as in many other species, may eventually lead to adulteration/substitution which is the major problem faced by the herbal drug industry today. Correct identification of a true raw drug market sample from a spurious one is also of course a hurdle (Reddy *et al*., 2015, Spandana *et al*., 2013 and Wealth of India, 1998).

Chromatographic fingerprinting is in use for evaluation of herbal drugs on a phytochemical marker basis for standardization and for quality control of both the raw material as well as the finished products in many cases. Such a chromatographic profile which is distinct can be used as an identity card for the drug, especially when specific chemical markers are not available for analysis (Li *et al*., 1998). In this context we have taken up a study to assess the present scenario of market adulteration in raw drug market of Kerala by the comparative analysis of the genuine sample and market samples of *Tinospora cordifolia* collected from different parts of Kerala. The results of the study are discussed.

MATERIALS AND METHODS

The genuine plant samples of *Tinospora cordifolia* was collected from College of Agriculture, Kerala Agricultural University, Thrissur campus and authenticated by botanist (Tomar, 2007). The samples were cleaned, shade dried and powdered. Five gram fine powder of each of the samples was refluxed with 50 ml methanol overnight. These extracts were cooled to room temperature, filtered, concentrated by evaporation under vaccum and was used for developing chemical fingerprint by TLC. Market samples of *Tinospora* were purchased from the herbal raw drug markets of different districts of Kerala. Total 50 market samples were purchased. Methanol extracts of these market samples (5g/50ml) were prepared as in the case of genuine samples and used for developing TLC fingerprint. Pre-coated flourescent silica gel 60 F_{254} plates were used as the

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stationary phase and chloroform: methanol (Ratio 17:1) as mobile phase. Solvent system suitable for separation of components was standardized as 17:1 chloroform: methanol by trying different combinations of organic solvents in varying proportions. The plates were developed up to a length of 8 cm in a CAMAG glass twin trough chamber (10 x 10 cm), previously saturated with the solvent systems for 15 minutes. After removal from the mobile phase, the plates were left to dry and viewed under UV-366 nm. The nature of spots and their R_f values were recorded and the TLC fingerprints of market samples were compared with that of reference standards of genuine samples to see the phytoequivalence (Harborne, 1998, Wagner and Bladt, 1966).

RESULTS AND DISCUSSION

The reference chromatographic profiles developed from three different *Tinospora* Spp. were clear and distinguished one species from the other (Fig. 1). They were taken as reference standards. Thespecific bands present in one species and absent in the other or vice versa can be of the compound/ compounds which can be taken as markers for distinguishing the samples. Comparative analysis of the reference TLC fingerprint profiles of genuine samples with that of market samples revealed that 47 samples out of 50 samples matched with *Tinospora cordifolia* reference chromatogram whereas other three samples did not matched with the reference profile of *Tinospora cordifolia* (Figure. 2). They showed additional bands or different bands proving that the samples are mixtures or spurious samples. The TLC method explained here is cheap as it requires no costly equipments and chemicals and is quick, completing within 30-40 minutes. Hence this methodology can be effectively employed for quality evaluation of the raw drug of *Tinospora cordifolia*. This study also revealed that the current raw drug market scenario in Kerala with respect to Giloy raw drug trade. Six percentage of the market samples analysed were not genuine whereas, 94% of the samples were genuine samples. Details of the markets from where samples collected and the inference obtained in the study are given in Table 1 and Table 2.

Figure.1.Specific chromatograms of three different species of Tinospora

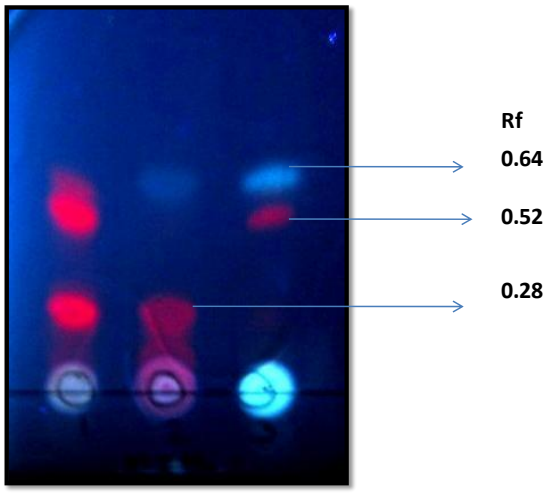


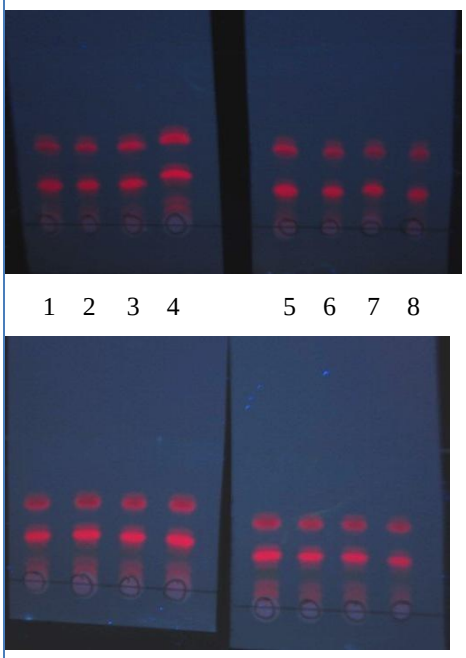
Figure 2. Chromatograms of market samples compared with genuine referencesamples of three different species s of Tinospora

REFERENCE PLATE

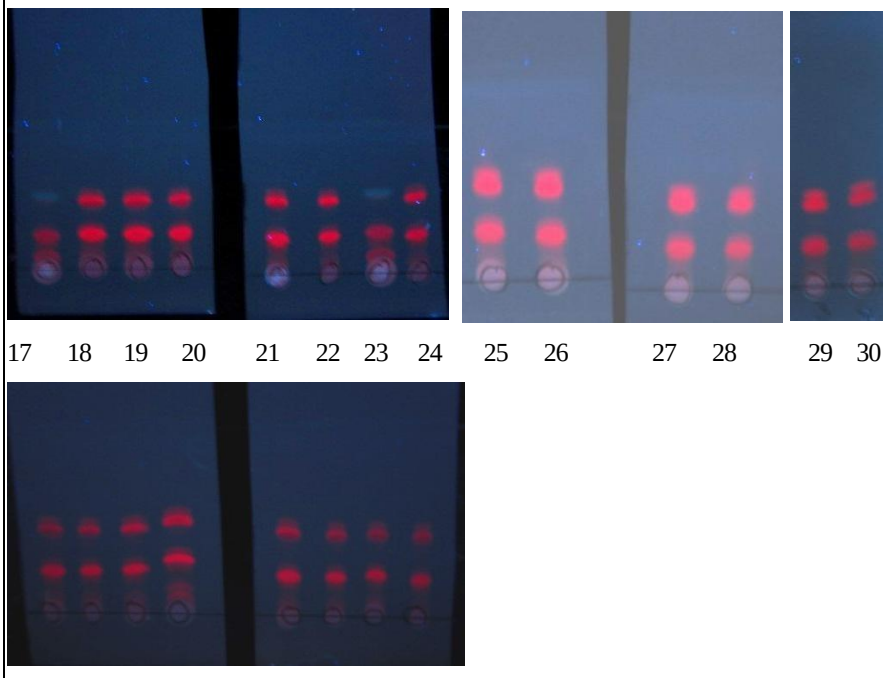
1. ***T.cordifolia***
2. ***T.malabarica***
3. ***T.crispa***

Methanol extract , 17:1 $CHCl_3$:Methanol ,UV-L Silicagel 60 F_{254}

Market samples-chromatogram



chromatogram of market samples



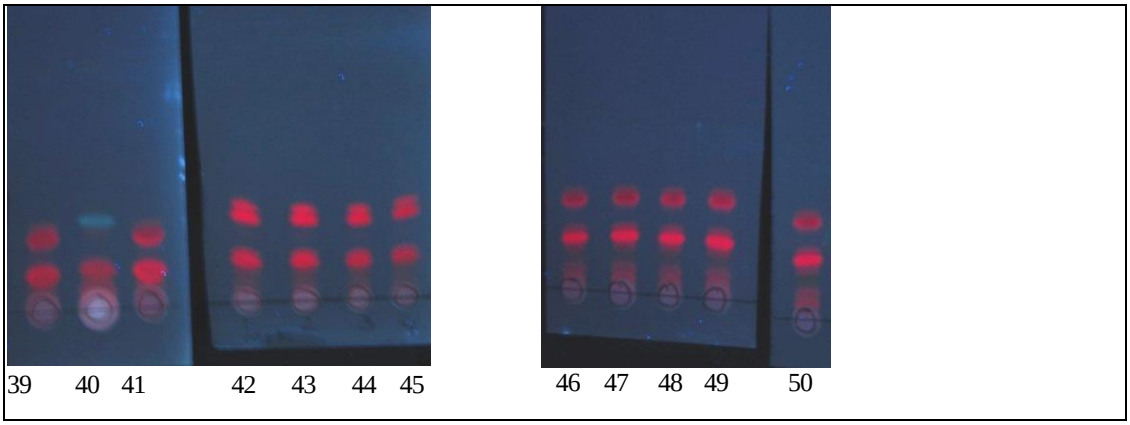


Table 1. Quality analysis of *Tinospora cordifolia* market samples

Total samples analysed (No:)	**Number of samples identified as *Tinospora cordifolia***	**Number of samples identified asspurious**
50	47 (94%)	3 (6%)

Table 2. Details of market samples and the observation after quality evaluation

Sample code No:	**Market drawn**	**Observation**
TC1	Thrissur 1	Genuine sample, *T.cordifolia*
TC 2	Thrissur 2	Genuine sample,*T.cordifolia*
TC 3	Thrissur 3	Genuine sample, *T.cordifolia*
TC4	Kollam 1	Genuine sample, *T.cordifolia*
TC5	Kollam 2	Genuine sample, *T.cordifolia*
TC6	Kollam 3	Genuine sample, *T.cordifolia*
TC7	Karunagappally1	Genuine sample, *T.cordifolia*
TC8	Cherthala 1	Genuine sample, *T.cordifolia*
TC9	Cherthala2	Genuine sample, *T.cordifolia*
TC10	Guruvayur1	Genuine sample, *T.cordifolia*
TC11	Pattambi1	Genuine sample, *T.cordifolia*
TC12	Trivandrum1	Genuine sample, *T.cordifolia*
TC13	Kunnamkulam1	Genuine sample, *T.cordifolia*
TC14	Kalady1	Genuine sample, *T.cordifolia*
TC15	Kalady2	Genuine sample, *T.cordifolia*
TC16	Kodungalloor1	Genuine sample, *T.cordifolia*
TC17	Muvatupuzha1	**Spurious sample**
TC18	Alappuzha1	Genuine sample, *T.cordifolia*
TC19	Alappuzha2	Genuine sample, *T.cordifolia*
TC20	Kottayam1	Genuine sample, *T.cordifolia*
TC21	Kasargod1	Genuine sample, *T.cordifolia*
TC22	Chalakudy1	Genuine sample, *T.cordifolia*
TC23	**Chalakudy2**	**Spurious sample**
TC24	Chalakudy3	Genuine sample, *T.cordifolia*
TC25	Chalakudy4	Genuine sample, *T.cordifolia*
TC26	Ankamaly1	Genuine sample, *T.cordifolia*
TC27	Mannuthy1	Genuine sample, *T.cordifolia*
TC28	Kothamangalam1	Genuine sample, *T.cordifolia*

TC29	Kodakara1	Genuine sample, *T.cordifolia*
TC30	Kodakara2	Genuine sample, *T.cordifolia*
TC31	Perumbavur	Genuine sample, *T.cordifolia*
TC32	Kalady	Genuine sample, *T.cordifolia*
TC33	Wayanad1	Genuine sample, *T.cordifolia*
TC34	Kuttipuram	Genuine sample, *T.cordifolia*
TC35	kozhikode	Genuine sample, *T.cordifolia*
TC36	Valanchery	Genuine sample, *T.cordifolia*
TC37	Vatanappilly	Genuine sample, *T.cordifolia*
TC38	Alathur	Genuine sample, *T.cordifolia*
TC39	Thaliparamba	Genuine sample, *T.cordifolia*
TC40	**Koilandy**	**Spurious sample**
TC41	Irinjalakuda	Genuine sample, *T.cordifolia*
TC42	Vatakara	Genuine sample, *T.cordifolia*
TC43	Kottakkal	Genuine sample, *T.cordifolia*
TC44	Ottapalam	Genuine sample, *T.cordifolia*
TC45	Perimthalmanna	Genuine sample, *T.cordifolia*
TC46	Cheruvanur	Genuine sample, *T.cordifolia*
TC47	Thodupuzha	Genuine sample, *T.cordifolia*
TC48	Changaramkulam	Genuine sample, *T.cordifolia*
TC49	Kannur	Genuine sample, *T.cordifolia*
TC50	Kattappana	Genuine sample, *T.cordifolia*

CONCLUSION

From the results of this study it can be concluded that spurious samples of *Tinospora cordifolia* (Giloy) has started coming in trade in the herbal raw drug markets of Kerala. Six percentage of the market samples analysed in the study were spurious whereas, 94% of the samples were found as pure samples.

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