QUALITY EVALUATION OF THE TRADED CRUDE DRUG OF SIDA ROOTS IN KERALA

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Abstract: Sida is one of the important medicinal plants found in Kerala . Sida root is the major ingredient in many Ayurvedic formulations like Bala taila, Ksheerabala, Baladi kvatha, Baladhyam gritham etc. The root portion is medicinal with thermogenic, antioxidant, antiinflammatory, antiseptic, hypotensive and tonic effects. The drug is useful in vitiated conditions of *kapha* and *vata*, inflammations, wounds, ulcers, jaundice, burns, skin diseases, abdominal disorders, diabetes, fever and general debility. The rising demand for this drug has led to its widespread adulteration. It is widely adulterated with similarly looking roots. This paper presents the results of quality assessment evaluation of the market samples of sida roots collected from different parts of Kerala. In the study the thin layer chromatographic profiles of genuine sida root samples were compared with that of market samples. For differentiating genuine samples of sida roots from spurious samples, our centre has developed an easy, quick and reliable TLC method using the methanol extract. This method can be recommended as a tool for the floor level checking of the market samples for ensuring the quality .The study revealed that out of 67 market samples analysed only 38 were pure and 29 were spurious.

Key words: Adulteration, Sida sps, Bala, Thin layer chromatography(TLC).

Introduction: Plants are living factories synthesizing medicinally as well as economically important chemical compounds. The genus Sida commonly called as Bala, belongs to the family Malvaceae. Sida root is extensively used in the treatment of rheumatism in ayurveda. It is also effectively utilized for heart diseases, urinary bladder disorders, malaria etc. According to Ayurveda 'Bala' balances tri doshas – *vata, pitta, kapha*. It has more effect on vata dosha. There are about 200 species of sida found all over the world . Four different species are commonly found in Kerala. They are *Sida cordifolia, Sida acuta, Sida cordata, Sida rhombifolia Ssp retusa* and *Ssp rhombiflia. S. cordifolia* Linn. is considered as the source of raw drug bala in North India while in South India vaidyas prefer *S. rhombifolia Linn Ssp retusa* (Linn.) Borss.(Syn. *Sida rhombifolia* var. *retusa* (Linn.) Mast. In markets the drug is commonly adulterated with *Sida acuta* widely distributed as a weed in the barren lands and roadsides of Kerala .The availability of *S. retusa* is decreasing day by day and cultivation is meagre. Scarcity of genuine materials from wild and practically no cultivation as in many other species, has led to adulteration. Adulteration /substitution is the major problem faced by the herbal drug industry today. Confusion is there in correct identification of a true raw drug market sample from a spurious one. The road sides and village court yards in Kerala, once up on a time, were rich with medicinal plants, shrubs and annual herbs like "Kurunthotti" (Sida) are now permanently getting lost [1]-[3].

Chromatographic fingerprinting has been in use for a long time for evaluation of herbal drugs on a phytochemical basis. Thin-layer chromatography can be successfully used for standardization and quality control of both the raw material as well as the finished products. Such a profile will be distinct and forms a benchmark of the drug, especially when identities of active principles are not known or when chemical markers are not available for analysis as in sida [4]-[6]. 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 root samples of two different sida species (used as source of Bala in North India and South India) and market samples of sida from different parts of Kerala .The results of the study are discussed.

Materials and Methods: The genuine plant samples of *Sida cordifolia* (North Indian sida) and *Sida retusa* (South Indian sida) were collected from College of Horticulture, Kerala Agricultural University, Thrissur campus and authenticated by botanists. The roots 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. Root samples were purchased from the herbal raw drug markets of different districts of Kerala. Total 67 market samples were purchased. Methanol extracts of these market samples (5gm/50ml) were also prepared as in the case of genuine samples and used for developing TLC profiles . Pre-coated flourescent silica gel 60 F_{254} plates were used as the stationary phase and toluene: ethyl acetate and diethyl amine (7:2:1) as mobile phase. The plates were developed up to a length of 8 cm in a glass trough chamber (10 x 10 cm), previously saturated with the solvent systems for

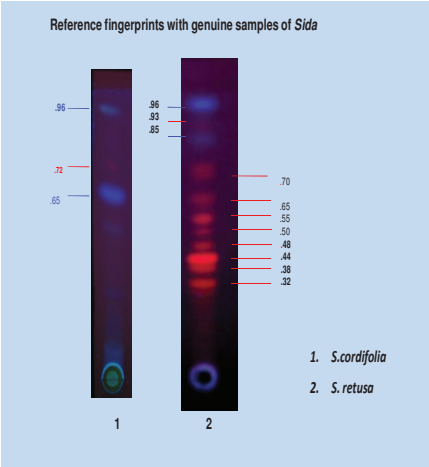

Figure.I.Reference TLC profile

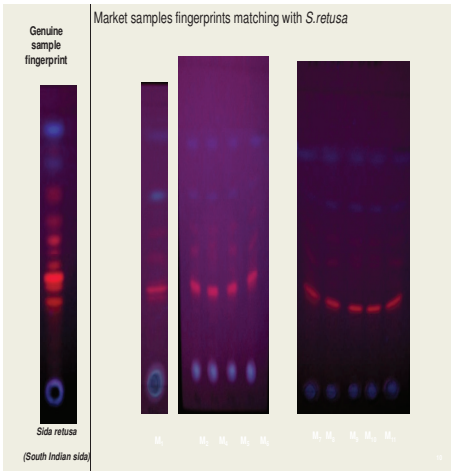

Figure..II.TLC profile comparison

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

Sample no:	Market drawn	Observation	Sample No:	Market drawn	Observation
M1	Thrissur	*S.retusa*	M35	Pattambi	spurious
M2	Thrissur	*S.retusa*	M36	Kunnamkulam	spurious
M3	Thrissur	spurious	M37	Kunnamkulam	spurious
M4	Chalakudy	*S.retusa*	M38	Kuttippuram	*S.retusa*
M5	Chalakudy	*S.retusa*	M39	Valanchery	spurious
M6	Chalakudy	*S.retusa*	M40	Kottakkal	*S.retusa*
M7	Ankamaly	*S.retusa*	M41	Kottakkal	*S.retusa*
M8	Ankamaly	*S.retusa*	M42	Kottakkal	*S.retusa*
M9	Ankamaly	*S.retusa*	M43	Thirur	*S.retusa*
M10	Muvatupuzha	*S.retusa*	M44	Kozhikode	spurious
M11	Muvatupuzha	*S.retusa*	M45	Kozhikode	spurious
M12	Muvatupuzha	*S.retusa*	M46	Wayanad	*S.retusa*
M13	Kalady	*S.retusa*	M47	Wayanad	spurious
M14	Kalady	*S.retusa*	M48	Kannur	spurious
M15	Kalady	*S.retusa*	M49	Kannur	spurious
M16	Alapuzha	*S.retusa*	M50	Kannur	spurious
M17	Alapuzha	spurious	M51	Kasargod	spurious
M18	Alapuzha	*S.retusa*	M52	Ernakulam	spurious
M19	Paravur	spurious	M53	Ernakulam	spurious
M20	Vazhakulam	spurious	M54	Ernakulam	spurious
M21	Kothamangalam	*S.retusa*	M55	Wadakanchery	*S.retusa*
M22	Irinjalakuda	*S.retusa*	M56	Wadakanchery	spurious
M23	Kodungallur	*S.retusa*	M57	Chavakad	spurious
M24	Kottayam	*S.retusa*	M58	Palkkad	spurious
M25	Kottayam	*S.retusa*	M59	Palkkad	*S.retusa*
M26	Kottayam	*S.retusa*	M60	Changaramkulam	spurious
M27	Kollam	*S.retusa*	M61	Olarikkara	spurious
M28	Kollam	spurious	M62	Kodgallur	spurious
M29	Kollam	*S.retusa*	M63	Thana	spurious
M30	Karunagappilly	*S.retusa*	M64	Chentrapinni	*S.retusa*
M31	Cherthala	*S.retusa*	M65	Irinjalkuda	spurious
M32	Cherthala	spurious	M66	Attapadi	*S.retusa*
M33	Guruvayur	*S.retusa*	M67	Valappad	spurious
M34	Pattambi	*S.retusa*			
M35	Pattambi	spurious			

15 minutes. Solvent system suitable for separation of components was standardized by trying different combinations of organic solvents in varying proportions. 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 developed were compared with that of reference standards of genuine samples to see the phytoequivalence.

Results and Discussion: The reference chromatographic profiles developed from *Sida cordifolia* and *Sida retusa* were very clear and effectively distinguished one species from the other (Fig.I). They were taken as reference standards. The specific 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 true samples from spurious samples, eventhough the chemistry of the compound is unknown. Comparative analysis of the reference TLC fingerprint profiles of genuine root samples of sida with that of market samples revealed that 38 samples out of 67 samples matched with *Sida retusa* root samples whereas other samples did not matched with the reference profile of *Sida retusa* (South Indian sida) (Fig.II).

They showed additional bands or different bands proving that the samples are mixtures or spurious samples. Among sixty seven samples analysed none of them were S*ida cordifolia* (North Indian sida). Khatoon and coworkers (2005) has earlier reported a HPTLC method for the quality evaluation of sida root which of course is very costly [7]. But the TLC method we have developed is cheap as it requires no costly equipments and chemicals and is quick, completing within 30-40 minutes. Hence this tool can be effectively employed for the quality evaluation of raw drug of sida root. This study also threw light on the current raw drug market scenario in Kerala .It revealed that 43.3 % of the sida market samples analysed were not genuine whereas, 56.7 % of the samples were genuine *Sida retusa* root samples. Details of the markets from where samples collected and the inference obtained in the study are given in Table I.

Acknowledgment: The financial assistance from AICRP on Medicinal , Aromatic Plants and Betelvine is gratefully acknowledged.

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