

Physical and Phyto-chemical evaluation of market samples of Madhuka (Irattimadhuram) from South Kerala

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Madhuka is a drug of prime importance in Ayurveda. In Kerala, it is commonly known as Irattimadhuram. It is an ingredient of many Ayurvedic formulations like anu taila, lakshadi taila, jivantyadi ghrita, jatyadi ghrita, rasnadi kwatha etc. The drug is useful in many disease conditions like jwara, visarpa, vatarakta, kushta etc... It is effectively proved with properties such as anticonvulsant effects¹, cerebroprotective effect², antidyslipidaemic activity³, memory enhancing⁴ etc.

In API⁵, the drug is identified as Glycyrrhiza glabra Linn belong to Fabaceae family. It is an under shrub mainly cultivated in Punjab, Jammu Kashmir etc.

Quality of formulations depends on the purity, quality and genuineness of raw drugs. In Kerala, irattimadhuram is used in a wide variety of formulations. However, due to unfavourable climatic conditions, it is not cultivated in Kerala. This arises a doubt about adulteration of drug with other drugs or same drug of inferior quality. The study was an attempt to detect any prevailing adulteration in the markets of south kerala.

Method

The study was conducted in two different phases of sample collection and sample evaluation.

The genuine samples were collected from herbal garden of Central Ayurveda Research Institute for Respiratory Disorders, Patiala, Punjab and was authenticated from pharmacognosy unit, Govt Ayurveda College, Thiruvananthapuram.

Market samples were collected from each of the 5 districts of South Kerala (Thiruvananthapuram, Kollam, Pathanamthitta, Kottayam, Alappuzha).A total of 10 samples were collected, one from the rural area and one from the urban area.

The genuine and market samples of Madhuka were thoroughly cleaned by washing, cut into small pieces and dried in shade. They were then powdered and was sieved through mesh size 80, stored in zip lock packets and air tight containers and labelled clearly as Sample A (Urban sample) and Sample B (Rural Sample)..

The samples were evaluated for physical and phytochemical characters, HPTLC and AAS. The results obtained were compared with the genuine sample and also with the characteristics mentioned in Ayurvedic Pharmacopoeia of India.

The physico-chemical analysis includes evaluation of moisture content, volatile oil content, total ash, acid insoluble ash, water- soluble extractive, alcohol soluble. Qualitative analysis was done for the evaluation of steroids, phenols, alkaloids, flavonoids and tannins. It also includes the results of HPTLC and AAS.

The preliminary physical and phytochemical evaluation of the genuine and market samples of Madhuka (*Glycyrrhiza glabra Linn*) were carried out in the Chemistry Lab, Drug Standardization Unit, Government Ayurveda College, Thiruvananthapuram.

Observations

Table 1: Physical analysis of Genuine and Market samples

Physical Parameters	Foreign matter (%)	Moisture content (%)	Volatile oil (%)	Total ash (%)	Acid insoluble ash (%)	Water soluble extractive (%)	Alcohol soluble extractive (%)	Fiber content (%)	Total sugar (%)	Reducing Sugar (%)
API	-	-	-	Not>10	Not>2.5	Not<20	Not<10	-	-	-
Genuine sample	0.3	5.6	0.01	4.25	0.65	25.69	17.2	24.6	5.03	3.4
TVM A	1.3	13.2	Traces	6.25	0.95	21.5	10.2	23.8	2.8	1.25
TVM B	1.8	12.5	Traces	9.16	0.89	16.5	9.2	18.7	3.2	2.6
KLM A	1.5	10.6	Traces	5.16	0.75	22.4	12.2	22.5	3.89	2.1
KLM B	1.5	14.2	Traces	6.25	1.82	21.6	10.1	21.6	4.1	2.5
PTM A	2.1	12.5	Traces	6.16	1.68	18.7	9.2	22.6	2.67	1.3
PTM B	1.7	11.8	Traces	6.58	0.85	19.6	8.6	21.5	3.7	2.1
ALP A	2.1	13.2	Traces	6.41	0.89	22.3	10.8	18.9	3.5	2.15
ALP B	1.3	15.6	Traces	5.58	0.77	22.8	11.2	21.6	3.9	2.5
KTM A	2.6	13.5	Traces	8.25	1.66	19.2	8.5	20.5	3.5	2.1
KTM B	1.3	10.8	Traces	7.41	1.41	21.2	11.8	21.5	3.9	1.7

Table 2: Qualitative analysis of Genuine and Market samples

Samples	Tannins	Steroid	Phenol	Alkaloid	Flavonoid
Genuine sample	+++	+++	++	++	+++
TVM A	++	+++	++	++	++
TVM B	++	++	++	++	++
KLM A	++	++	++	++	++
KLM B	++	++	++	++	++
PTM A	++	++	++	++	++
PTM B	++	++	++	++	++
ALP A	++	++	++	++	++
ALP B	++	++	++	++	++
KTM A	++	++	++	++	++
KTM B	++	++	++	++	++

Table 4: Results of Heavy metal Analysis of genuine and Market Samples

SI No	Samples	Heavy metal concentration (in ppm)			
		Cd	Pb	Fe	Cu
1	Genuine sample	0.0127	0.0940	13.042	0.0609
2	TVM A	0.0234	0.1361	4.4564	0.2584
3	TVM B	0.0351	0.1323	10.0579	0.3002
4	KLM A	0.0285	0.3737	9.1981	0.33263
5	KLM B	0.0096	0.0711	0.0907	10.9475
6	PTM A	0.0298	0.1715	10.1327	0.2683
7	PTM B	0.0261	0.1245	5.7337	0.2543
8	ALP A	0.0278	0.1567	6.4869	0.2768
9	ALP B	0.0286	0.1638	9.9963	0.2634
10	KTM A	0.0218	0.1934	10.6388	0.2313
11	KTM B	0.0287	0.2321	5.7337	0.2426

TLC Analysis of Genuine and Market Samples

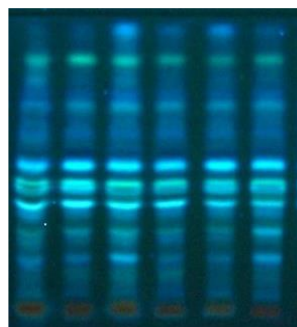
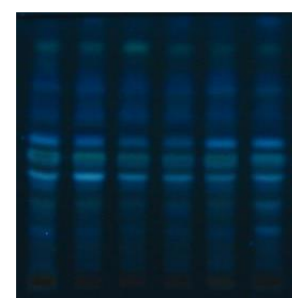
The ethanolic extracts of sample of were subjected to Thin Layer Chromatography in the solvent system Toluene: Ethyl acetate: Formic acid in the proportion 12:10:2 drop. The plates were allowed to develop and then the spots were visualized in visible light and UV (366nm).

Ethanolic Extract	No. of Spots	Rf value
Genuine <i>sample</i>	3	0.33 0.59 0.69
TVM A	3	0.22 0.32 0.57
TVM B	3	0.19 0.35 0.57
KLM A	3	0.25 0.34 0.56
KLM B	3	0.12 0.36 0.58
PTM A	3	0.27 0.38 0.53
PTM B	3	0.21 0.34 0.57
ALP A	3	0.23 0.34 0.56
ALP B	3	0.25 0.42 0.55

KTM A	3	0.29 0.36 0.57
KTM B	3	0.29 0.36 0.57

Comparison of HPTLC results of the genuine and market samples

HPTLC profiling ethanolic extracts of all the market samples of Yashtimadhu were done in the solvent system Toluene: Ethyl acetate: Formic acid in the proportion of 12: 10:2 drop.



Track	Samples
1	Genuine
2	TVM
3	KLM
4	PTM
5	ALP
6	KTM

Discussion

Foreign matter was comparatively high in market samples (Urban and Rural) than genuine sample. In the market samples, a good quantity of the samples were deteriorated. The increased value of foreign matter implies reduced purity of drugs. Moisture content mean was significantly high in market samples than the genuine sample which may lead to deterioration of the drugs and formulations.

The mean value of the total ash content and acid insoluble ash was comparatively higher in the market samples than the genuine sample but was still within the limits prescribed in API. The mean extractive values of the market samples were lower as compared to the genuine sample. The fiber content of genuine sample was comparatively higher than that of the market sample. The total sugar and reducing sugar content was comparatively higher in genuine sample compared to the market samples. Volatile oil content was nil in the market samples and in the genuine sample.

Qualitative analysis showed the presence of appreciable amounts of tannins, steroids and flavonoids and moderate amount of alkaloids and phenols in genuine sample. Moderate amount of tannins, steroids, flavonoids, alkaloids and phenols are present in market samples. Urban samples from Trivandrum also showed appreciable amount of steroids.

Atomic Absorption Spectroscopy (AAS) revealed the presence of heavy metals (Cd, Cu, Fe, Pb) within permissible limits for the genuine and market samples.

In TLC and HPTLC analysis of samples, similarities in the peaks suggests the presence of similar chemical constituents in it.

The results of physical and phytochemical evaluation of the market samples of *Madhuka* were identical to that of the genuine sample and also to the standards mentioned in Ayurvedic Pharmacopoeia of India.

Conclusion

The market samples obtained from raw drug markets of South Kerala are genuine but of slightly inferior quality.

References

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