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Research Article

QUALITATIVE ANALYSIS OF HERBAL MEDICINES W.R.T. ATIBALA (*ABUTILON INDICUM* (L.) SWEET.)

Mahesh TS[1*], Shreevidya M[2]

[1] Professor, Department of Post Graduate Studies in Dravyaguna Vijnana, Alva's Ayurveda Medical College Moodbidri, Karnataka, India
[2] Associate Professor, Department of Post Graduate Studies in Rasashastra, Alva's Ayurveda Medical College Moodbidri, Karnataka, India

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*Corresponding Author: **Mahesh T.S**
Professor, Dept Of Dravyaguna, Alva's Ayurveda Medical College, Vidyagiri, Moodbidri,– 574227 D.K. District, Karnataka, India

ABSTRACT

Identification of Medicinal plants is a subject which is of prime importance in assurance of its quality. It has posed itself to be of a great challenge to the various drug industries which use the medicinal plants as the source of raw materials for their produce. But due to the menace of adulteration there is fall in quality of these preparations. Thus to ensure quality of prepared medicines it is quite necessary that the raw materials are identified properly with the assessment of their quality. This is achieved by using the present available laboratory techniques for the purpose of assessment of quality, purity and the strength of the herbal drugs.
Atibala which is identified as *Abutilon indicum* (L.) Sweet[1] is a plant that has been used profusely in Ayurveda. Its enumeration in different groups by various scholars is the example of its use. Thus the plant is selected for the study and its observations are mentioned in detail.

Keywords: Ayurveda, *Abutilon indicum*, Balya, Atibala, Phytochemicals and Herbal medicine.

INTRODUCTION

Use of plants in the form of medicine has been right from the dawn of mankind in different forms as per their necessity in the combat of diseases. It has given rise to various systems of medicines such as Ayurveda, Unani, Homeopathy, etc. In the past the use of these plants the physician himself used to go to the source of its availability and collect himself as per their necessity. This resulted in a very controlled and judicious use resulting in the proper maintenance of its supply with assurance of its quality. In due course the demand for medicine increased due to various factors like population. This in turn created great demand for the supply of medicinal plants to cater the needs. This increase of demand resulted in the irrational collection of immature plants even though properly identified resulting in loss of quality. Along with it adulteration of plants with substandard substances further deteriorated the quality resulting in substandard medicinal preparations. Hence to assure quality of medicinal plants the Ayurvedic drug industry should adopt various measures such that the desired effect is obtained. To ensure the same the Ayurvedic Pharmacopoeia of India (API) has laid down certain measures like Ash values, estimation of foreign matter, etc for the medicinal plants that are used in Ayurveda.
Atibala (*Abutilon indicum* (L.) Sweet.) is a drug that has found its place in Ayurveda for its action namely Balya (that which promotes strength especially to the body)[2]. It profound use is also established by the fact that it has been enumerated in different groups of drugs like Balya, Brimhaneeya, etc[3]. mentioned in Ayurvedic Classical texts. It is also enumerated under Balachatushtaya[4]. Accordingly, the value of Atibala is mentioned as Foreign matter (not more than 2%), Total Ash (not more than 8%), Acid insoluble Ash (not more than 3%), Alcohol soluble extractive (not less than 3%) and Water soluble extractive (not less than 9%)[5]. The data present in the text is noted and compared with the obtained values of the scientifically identified samples as an example to highlight the significance of the study to ensure quality and purity along with strength of the medicinal plants.

MATERIALS AND METHODS

Collection of sample:
The sample of the drug namely *Abutilon indicum* (L.) Sweet. roots were collected from the area in and around Moodbidri

manually after ensuring its proper identification with the help of a qualified Botanist.

Place of Work:

The Phytochemical study of the drug was carried out in the Department of PG Studies in Dravyaguna Vijnana Laboratory of Alva's Ayurveda Medical College, Moodbidri D.K.

Procedure:

The present study of the plant Atibala (*Abutilon indicum* (L.) Sweet) is performed in five sections namely: Analysis of Physical standards, Extractive values in various solvents, Preliminary Phytochemical studies, Ash analysis and Qualitative analysis.

The first section consists of Analysis of Physical standards which consists of tests namely Determination of moisture content, Total Ash percentage, ash value, acid insoluble ash, water insoluble ash and pH value. To perform this, fine powder prepared from the air dried samples of Atibala (*Abutilon indicum* (L.) Sweet) roots are taken. Each test is performed with 5 gm of the drug sample as per the procedures mentioned in Ayurvedic Pharmacopeia of India (API). The values thus obtained are tabulated in the table No. 1 below. The obtained values are helpful in understanding the Strength and Identity of the given drug in a gross manner.

The Extractive values in various solvents ensure the purity and strength along with quality of the sample. These provide the information regarding the percentage of the content that gets soluble in different media like water, Alcohol, etc. This results one to understand the best media for extracting and obtaining the maximum benefit from the sample. In the present solvents namely, Water, Ethyl alcohol, Methanol, Chloroform, Petroleum ether and Acetone are used and their extractive values are tabulated in the table No. 2 below.

Preliminary Phytochemical Studies is helpful to know the basic constituents and also give an idea about the different organic substances present in the drug that may or may not be involved in bringing out a drug action. These constituents can be compound mixtures or even a single chemical substance. The single chemical substances include alkaloides, enzymes, proteins, Sugars and Vitamins. While fixed oils, fat, volatile oils, oleo-resins, oleo-gum, resins are the compound mixture of phytochemicals. In the present study the extracts of the samples of the trial drug obtained through various solvent like Methonol, Ethanol, Chloroform, Water and Petroleum ether are evaporated on a water-bath. It is then cooled and collected in clean containers. These are then subjected to various tests for analysis of the constituents. The results thus obtained are tabulated in the Table No. 3.

For the purpose of Ash Analysis, air dried Samples was taken in a crucible and made into ash by heating it in an electric Bunsen. The obtained ash is diluted with distilled water, boiled and filtered. The obtained filtrate is then subjected to Analysis. The results thus obtained are noted and tabulated in the Table No. 4

The Chromatographic fingerprinting is one of the most effective methods to ensure quality of a given sample. In the present study, it is performed from the alcoholic extract of the roots of Atibala (*Abutilon indicum* (L.) Sweet.) by HPTLC. 1 g of the plant powder was extracted with 10 ml of alcohol filtered and made up to 20 ml in alcohol in a standard flask. 10 and 20 µl of the above test solution was applied on silica gel plate and was developed using Toluene - Ethyl acetate - Formic Acid (1:0.5:0.1) as mobile phase. It was then observed and scanned under UV 254 and 366, and white light. The documentation of the plates showed numerous bands under UV 254, 366, under white light and after derivatisation. The Rf values of the Atibalaa plate is tabulated in table no. 5 and the photo of TLC plates are shown in plate no.1, 2, 3 and 4.

RESULTS AND OBSERVATION

Analysis of Physical Standards:

The obtained values (Table No.1) suggest that the root sample is slightly acidic in nature and is also having the values which are slightly lower that the standards laid in API. On comparison it is also seen that the value of acid insoluble ash is fractionally lower than the standard value.

Extractive values in various solvents:

The extractive values (Table No.2) obtained in the study showed that the value of water extract was fractionally lower while the ethanol extract it was far below from the value mentioned in API.

Preliminary Phytochemical Studies:

The obtained results in the study (Table No. 3) suggest that the roots consist of Proteins, Tannin, Saponin, Phenol, Steroid and Alkaloids.

Ash Analysis:

The results of Ash analysis (Table No. 4) performed in the study suggest that the roots possessed sodium.

Qualitative analysis:

The presence of various chemical constituents of the plant are detected and ascertained by the use of chromatography method. This method produces a pattern of bands which is usually unique. The peaks that are obtained upon scanning the plate correspond to the individual constituent present in the sample. This method helps to ensure the quality aspect of the sample and standardize the same. In the present study of Atibala densitometric scan at UV 254 nm, UV 366 nm, 540 nm, 620 nm was done which showed 15 peaks (Plate No.1), 16 peaks (Plate No. 2), 10 peaks under (Plate No.3) and 18n peaks (Plate No.4) respectively and is tabulated (Table No.5).

DISCUSSION

On observation of the values, it is noted that the powder of the sample is slightly acidic in nature and the values are nearly similar to that mentioned in the API taken as standard. This shows that the plant obtained is a genuine sample. From the analysis of phytochemicals it is noted that the plant contains Proteins, Tannin, Saponin, Phenol, Steroid and Alkaloids which are helpful to increase the nutrition and also the medicinal activity. The ash analysis indicates the presence of sodium in the plant. The tests namely Phytochemical analysis and Ash analysis are helpful to ensure the quality of the medicinal plant sample along with its strength to ensure the medicinal effect when used. The extractive value obtained showed that the maximum extract is attained from water. This gives the idea as which solvent is suitable to get the utmost

benefit from the plant. Lastly, the Chromotographic analysis showed a peak corresponding to the R_f value 0.5 which corresponds to the R_f value of Asparagin which is taken as a marker compound. This is due to the fact that Asparagin is one of the major chemical constituent present in this plant.

These tests thus conducted give the data that ensures the genuineness of the medicinal plant sample along with its quality. In the present study, the sample of Atibala which is obtained is genuine where it corresponds to majority of values present as standards. But the quality is slightly inferior in comparison to that of the one that is mentioned in the API which can be considered to be a superior quality. The variation may be a resultant of the change in environment, place of collection, time of collection, etc from where the sample is obtained. From the above study it can be noted that the tests are helpful in ascertaining the quality and genuineness of the medicinal plants.

CONCLUSION

From the study it can be concluded that the sample that is obtained is a genuine one but is not of the most superior quality as ascertained by the comparison with the standard values. Still the sample is also not the most inferior one either such that it may not produce the required activity. Thus the analysis will surely give an idea of the nature, strength and purity of the plants such that it can result in proper utilization. The analysis methods also help one to substantiate the uses of the plant as a nutrient and a potent medicinal substance.

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Table 1: Comparison of the documented and obtained values of Physical standards of Atibala (*Abutilon indicum* (L.) Sweet.)

Sl. No.	Physical Standard	% Obtained Value	Values in AFI
1.	Moisture Content	0.8	Not available
2.	Percentage of Total Ash	5.4	Less than 8
3.	Percentage of Acid insoluble Ash	2.2	Less than 3
4.	Percentage of Water Soluble Ash	3.84	Not available
5.	pH value	6.6	Not available

Table 2: Comparison of the documented and obtained values of Extractive values in various solvents of Atibala (*Abutilon indicum* (L.) Sweet.)

Sl. No.	Solvent for Extract	% Obtained Value	Values in AFI
1.	Water	8.2	Less than 9
2.	Ethanol	0.6	Less than 3
3.	Methanol	1.2	Not available
4.	Chloroform	1.6	Not available
5.	Petroleum ether	2.0	Not available
6.	Acetone	0.4	Not available

Table 3: The Results of the Chemical Analysis

Sl. No	Name of the Tests	Observation	Results
1	**Biuret test for Proteins**	No colour change	Absent
2	**Carbohydrate test**		
	Benedict's test (Reducing sugar)	No Precipitate	Absent
	Fehling's test (Non-reducing sugar)	No Precipitate	Absent
3	**Tannins**	Dark Brown	Present
4	**Saponin (Foam Test)**	Persisting Foam Present	Present

5	**Test for Flavonoids**	No Colour Change	Absent
6	**Test for Phenols**	Dark Brown colour seen	Present
7	**Steroids**		
	Liebermann-Buchard's test	Green colour precipitate	Present
	Salkowski's test	Red colour precipitate	Present
8	**Alkaloids (Mayer's test)**	Pale yellow precipitate	Present
9	**Triterpenoides**	No colour change	Absent
10	**Starch**	No colour change	Absent

Table 4: On the basis of the observations the results of Ash analysis

Components	***Abutilon indicum* (L.) Sweet.**
Carbonates	Negative
Flourides	Negative
Chlorides	Negative
Sulphate	Negative
Chromate	Negative
Phosphate	Negative
Potassium	Negative
Sodium	**Positive**
Aluminium	Negative
Calcium	Negative

Table 5: The R_f values of Atibala (*Abutilon indicum* (L.) Sweet.). obtained on Densitometric scan at 254nm and 366nm

Sl. No.	**254 nm**	**366 nm**	**540nm**	**Post- derivatisation**
1.	0.11 Green	-	-	-
2.	-	0.14 F.Violet	-	0.14 Violet
3.	0.23 Green	-	0.23 Brown	0.23 Violet
4.	-	0.27 F.Brown	-	-
5.	0.30 Green	0.30 F. Violet	-	-
6.	0.36 Green	0.36 F.Violet	-	0.36 Violet
7.	0.39 Green	0.39 F.Violet	-	-
8.	-	0.41 F.Pink	-	-
9.	0.45 Green	0.45 F.Violet	-	0.45 Dark purple
10.	-	0.48 F.Pink	0.48 Green	-
11.	0.50 Green	-	-	-
12.	-	0.51 F. Blue	-	-
13.	-	0.56 F.Yellow	-	0.56 Brown
14.	-	-	0.58 Yellow	-
15.	-	0.60 F.Blue	-	0.60 Violet
16.	0.63 Green	--	0.63 Brown	-
17.	-	0.66 F.Blue	-	0.66 Violet
18.	-	0.70 F.Pink	-	0.70 Violet
19.	-	0.72 F.Violet	-	-
20.	-	0.75 F.Red		-
21.	-	0.78 F.Blue	-	0.78 Violet
22.	0.82 Dark green	0.82 F.Red	-	-
23.	-	-	0.84 Green	-
24.	-	0.87 F.Red	-	-
25.		0.91 F.Red	-	-
26.	-	-	0.93 Green	-
27.	-	0.95 F.Violet	-	0.95 Violet
28.	-	-	-	0.98 Violet

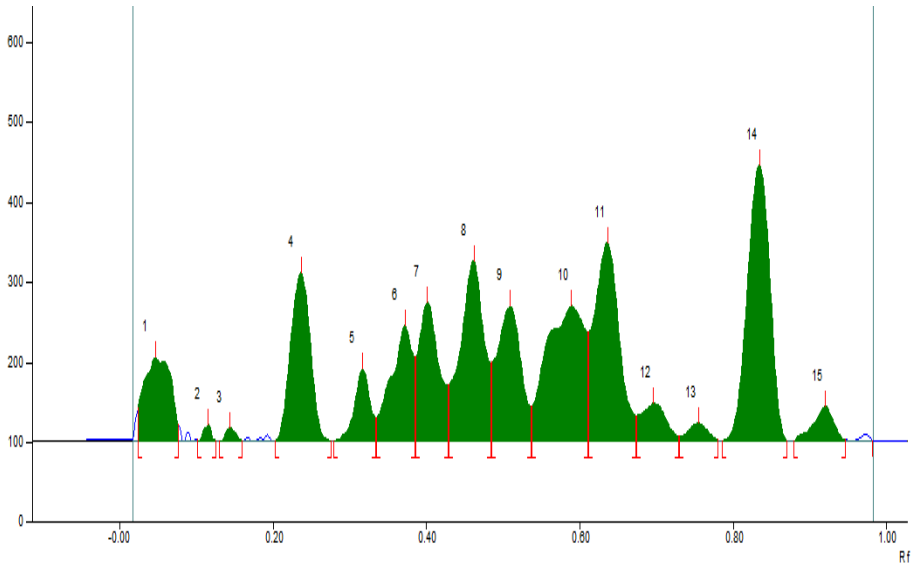

Plate No. 1: HPTLC Densitometric scan of Atibalaa extract (20µl) at 254 nm

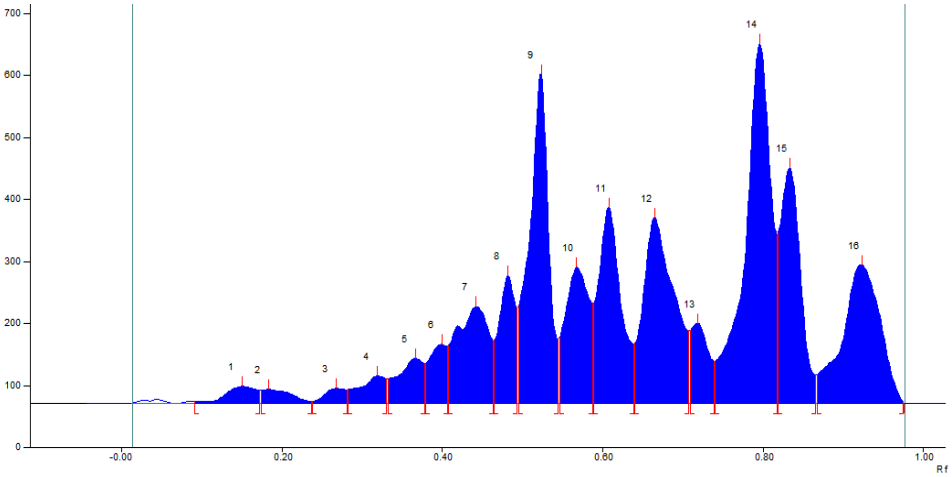

Plate No. 2: HPTLC Densitometric scan of Atibalaa extract (20µl) at 366 nm

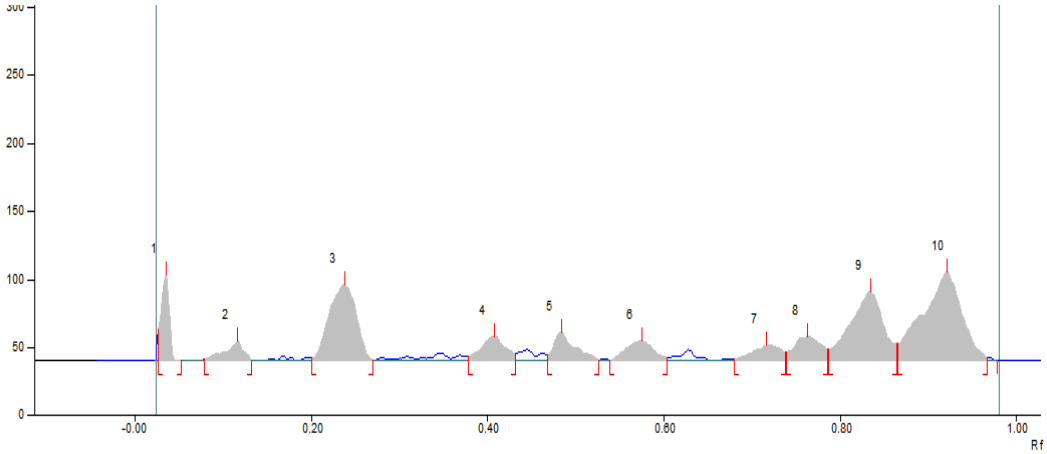

Plate No. 3: HPTLC Densitometric scan of Atibalaa extract (20µl) at 366 nm

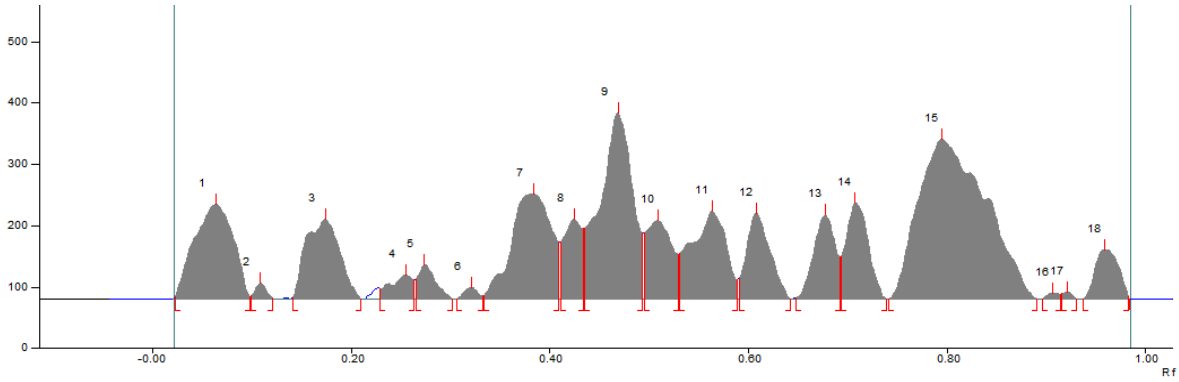

Plate No. 4: HPTLC Densitometric scan of Atibalaa extract (20µl) at 620 nm after derivatisation with vanillin sulphuric acid

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