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Research Article

Standardization Parameters of few India herbal drugs used in the treatment of gynecological disorders

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ABSTRACT

Gynecological disorders are very common among Indian women and are more prone in rural areas as compared with urban due to various issue among with un-hygienic conditions are at the top. As per Ayurvedic literature there are several plants used to cure women disorders, though there proper documentation and validation need to be established for quality and purity of herbal drugs. The present work aims to investigate the acute toxicity profile of few India medicinal plants. In this present study standardization parameters of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were investigated. The present investigation shows the results of morphological features and physicochemical evaluation of selected herbal drugs.

Keywords: Herbal drugs, Standardization parameters, Quality, gynecological disorders

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INTRODUCTION

In India approximately every women suffers from gynecological disorders such as vaginal infection, menstrual troubles or any other associated disease. The percentage is more in rural women than urban women and the reason behind this is the life style, food habit and un-hygienic conditions in rural areas¹⁻². Ayurveda deals with the study of India medicinal plants and usually it is considered as herbal drugs are less toxic or don't have any toxicity³⁻⁴. But the better use of these drugs there scientific validation need to be established. The present study was designed to evaluate the 4 Indian medicinal plants widely used to treat the gynecological disorders as mentioned in traditional system of medicine.

MATERIAL AND METHODS

Selection of plants/plant material

The herbs viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL used in the treatment of gynecological disorders were selected based on the traditional claims as mentioned in folk-lore. The above mentioned herbs are widely used in traditional medicine for the treatment of gynecological disorders but till date no any

systematic investigation has been carried out to reveal the physic-chemical parameters these herbal drugs, therefore an attempt was made to investigate the standardization parameters.

Collection and authentication of plant/plant material

The plant material selected for the present investigation viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were collected in the months of Dec' 2016 to Jan, 2017 from various sites of Malwa region of Madhya Pradesh and identified & authenticated by Dr. S.N. Dwivedi, Professor and Head, Department of Botany, Janata PG College, A.P.S. University, Rewa, (M.P.) and was deposited in our Laboratory, Voucher specimen No. P/AS-R/1812; P/CT-R/1813; P/IC-L/1814 and P/PP-L/1815.

Development of Standardization parameters of selected plant material

For a proper and orderly studies, need to standardized the medicinal plants is of prime importance. Keeping this view in mind various standardization parameters such as morphological investigation, anatomical studies and

physicochemical assessments was performed for the selected plant parts.⁵⁻⁶

Pharmacognostical studies

Morphological studies

The plant material selected for the present investigation viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were studied for their morphological investigations. In this section various morphological characters such as color, odor, taste, shape, size, surface characters and fractures were studied out.

Physico-chemical studies

The air dried plant material of the selected plant viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were subjected for the standard protocol for the evaluation of physico-chemical parameters. In this study various parameters such as foreign organic matter, loss on drying, total ash, swelling index, foaming index and extractive values were carried out.

Foreign organic matter (FOM)

Foreign organic matter is defined as any foreign particle other than selected plant material. For the determination of FOM 100 gm of plant material was spread in a white sheet of 100X100 cm and foreign matter is removed using a magnifying lens (10X). The remaining sample was weighted to determine the % FOM.

Loss on drying (LOD)/Moisture content

Loss on drying (LOD) is used to determine the amount of water/moisture in the sample of crude drug. For the determination of LOD 3 gm of the dried crude drug sample was taken and was placed in hot air oven for 1 hr. at 105°C. After specified duration drug was weighed and percentage LOD was determined.

Total ash

Ash is defined as residue after incineration and is useful in determining the quality and purity of the crude drug. For determination of ash value about 4 gm of air dried powdered crude drug was placed in weighted tared silica crucible. The sample was ignited in muffle furnace at the temperature 400-450°C until red hot residue, it indicates the absence of carbon. The crucible was cooled and weighed to determine the total ash with reference to air dried material.

Swelling index

It is defined as the swelling powder of the dried crude drug. For the determination 1 gm of powdered crude drug material was placed in measuring cylinder and was left for 24 hr., after the specified time the swelled material was measured in reference to initial.

Foaming index

Foaming index was determined to detect the presence of saponins. 1 gm of the coarsely powdered drug was shaken with 10 ml of distilled water in a test tube for 15 mts. After 5 mts the stable foam was noted down.

Extraction of plant material

Extraction of *Achyranthes aspera* Linn. (Roots)

250 gm of the air dried coarsely powdered roots of *Achyranthes aspera* Linn. (ASR) was placed in soxhlet

apparatus and was extracted with hydro-alcohol (water:ethanol:70:30) until the extraction was completed. After extraction, the filtrate was evaporated and percentage extract was determined.

Extraction of *Clitoria ternatea* Linn. (Roots)

250 gm of the air dried coarsely powdered roots of *Clitoria ternatea* Linn. (CTR) was placed in soxhlet apparatus and was extracted with hydro-alcohol (water:ethanol:70:30) until the extraction was completed. After extraction, the filtrate was evaporated and percentage extract was determined.

Extraction of *Ipomea cairica* Linn. (Leaves)

250 gm of the air dried coarsely powdered leaves of *Ipomea cairica* Linn. (ICL) was placed in soxhlet apparatus and was extracted with hydro-alcohol (water:ethanol:70:30) until the extraction was completed. After extraction, the filtrate was evaporated and percentage extract was determined.

Extraction of *Plumeria pudica* Jacq. (Leaves)

250 gm of the air dried coarsely powdered leaves of *Plumeria pudica* Jacq. (PPL) was placed in soxhlet apparatus and was extracted with hydro-alcohol (water:ethanol:70:30) until the extraction was completed. After extraction, the filtrate was evaporated and percentage extract was determined.

Preliminary phytochemical screening of extract

Plants have various chemical constituents and the physiological and therapeutic efficacy is the results due to various combinations of these secondary metabolites present. The constituents present in the plants clarify the uses of the plants but small fragments have been reported and investigated for the presence of active constituents in the plants. The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were investigated for the presence of various phyto-constituents present. The qualitative tests were performed to determine the active constituents present in the extracts.

Test for Alkaloids

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in dilute sulphuric acid and were filtered. The filtrate (about 1 ml) thus obtained was tested with mayer's reagent, dragendorff's reagent, hager's reagent and wagner's reagents respectively. Appearance of cream, orange brown, yellow and reddish brown precipitate indicates the positive results and finally the presence of alkaloids.

Test for Carbohydrates

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in water and were filtered. The filtrate (about 1 ml) thus obtained was treated with concentrated sulphuric acid followed by molisch's reagent. Appearance of pink to violet color confirms the presence of carbohydrates.

Test for Tannins

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in water and were treated with 5% ferric chloride solution. Appearance of blue color indicates the presence of tannins.

Test for steroids and triterpenoids

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were refluxed with alcoholic potassium hydroxide until the saponification takes place and the mixture was diluted with distilled water and ether, the extract was evaporated and subjected to Liebermann burchad's test. Brown ring which turns green confirm presence of steroids and deep red color indicate presence of triterpenoids.

Test for glycosides

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in water and treated with brontrager's test. Pink color indicates confirm presence of glycosides.

Test for gums and mucilage

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in alcohol with constant stirring, formation of precipitate indicates presence of gums and mucilages.

Test for fixed oil and fats

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in alcohol and was pressed between two filter paper, presence of oil stain in paper indicates presence of fixed oil and fats.

Test for saponins

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in water and was

shaken to produce the foam, formation of stable foam indicates presence of saponins.

Test for flavonoids

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in alcohol and subjected to shinoda test, appearance of pink color indicates presence of flavonoids.

Test for proteins and amino acid

The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were dissolved in alcohol and subjected to ninhydrin reagent, purple color indicate presence of proteins and amino acid.

RESULTS AND DISCUSSION

Madhya Pradesh a central provision of India had a wide variety of medicinal plants. There are several tribes such as kol, baigha, bhil, bhilas, patliyas etc. scattered in various regions of Madhya Pradesh viz., Vindhya region, Malwa region and Nimar region. The tribes of these regions used a variety of herbal drugs and their preparations for the treatment of several diseases including gynecological disorders. Gynecological disorders are very common among the tribal women's of Madhya Pradesh due to various factors among which unhygienic is one of the prime reason. The present investigation carries a result of **Standardization Parameters of few India herbal drugs used in the treatment of gynecological disorders**. It indicate the uses of four herbal drugs viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL for the treatment of said disorders. In this study morphological study, physicochemical parameters, extraction of plant material, phytochemical screening of extracts were carried out and reported.

Pharmacognostical studies

Morphological studies

The morphological characteristics such as color, odor, taste, shape, size, surface characters and fractures of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were studied out. The results were mentioned in table 1.

Table 1: Morphological features of selected herbal drugs

S/No.	Morphological features	ASR	CTR	ICL	PPL
1.	Color	Pale white	Puff white	US=Green LS=Light green	US=Parrot green LS=Light green
2.	Odor	Sweet	Characteristics	Peculiar	Characteristics
3.	Taste	Sweet	Slightly bitter	Acceptable	Acrid
4.	Shape	Cylindrical	Cylindrical	Oval	Oblong
5.	Size	Variable	Variable	L=2-5cm B=3-7 cm	L=5-12cm B=3-5 cm
6.	Surface character	Smooth	Smooth	Smooth	Smooth
7.	Fracture	Absent	Smooth	Absent	Absent

Abbr. ASR= *Achyranthes aspera* Linn. (Roots); CTR= *Clitoria ternatea* Linn. (Roots); ICL= *Ipomea cairica* Linn. (Leaves); PPL= *Plumeria pudica* Jacq. (Leaves) PPL

Physico-chemical studies

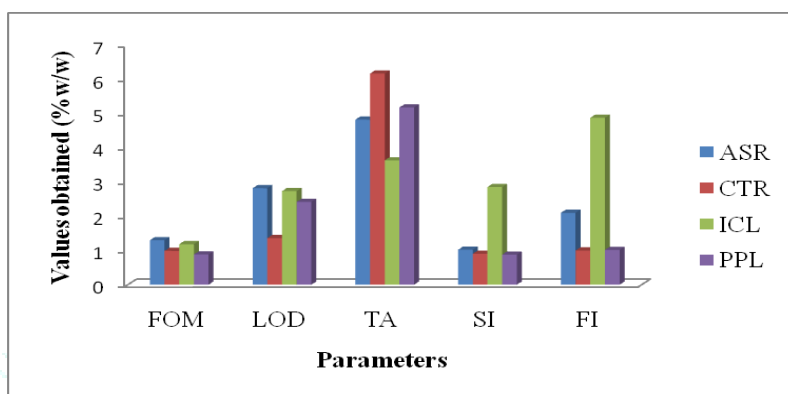
The physico-chemical parameters such as foreign organic matter, loss on drying, total ash, swelling index, foaming index and extractive values were carried out for the selected

plant viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL. The values obtained were given in table 2. Graph 1 reflects the comparative physicochemical activity of various selected herbal drugs.

Table 2: Physico-chemical studies selected herbal drugs

S/No.	Selected Plant Part	Parameters Values obtained (%w/w)				
		FOM	LOD	TA	SI	FI
1.	ASR	1.2983	2.8162	4.8174	1.0211	2.0981
2.	CTR	0.9861	1.3602	6.1629	0.9022	0.9978
3.	ICL	1.1829	2.7317	3.6293	2.8521	4.8723
4.	PPL	0.8817	2.4182	5.1738	0.8771	1.0164

Note: All values are average of three readings (n=3)



Graph 1: Physico-chemical studies selected herbal drugs

Extraction of plant material

The extraction of selected plant viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves)

PPL were carried out using water & ethanol (70:30). The results obtained were presented in table 3. Results indicated that all the extract has neutral pH and HAEPL have highest percentage of extract obtained.

Table 3: Extract profile of selected herbal drugs

S/No.	Extract	Color	Nature	pH	Estimated Percentage (%w/w)
1.	HAEASR	Brown	Solid Powder	7.10	14.8251
2.	HAECTR	Light brown	Solid Powder	7.13	13.1429
3.	HAEICL	Light green	Solid Powder	7.14	15.7216
4.	HAEPL	Green	Sticky Solid	7.04	18.3615

Note: All values are average of three readings (n=3)

Abbr.: HAEASR=Hydroalcoholic extract of *Achyranthes aspera* Linn. (Roots); HAECTR=Hydroalcoholic extract of *Clitoria ternatea* Linn. (Roots); HAEICL=Hydroalcoholic extract of *Ipomea cairica* Linn. (Leaves); HAEPL=Hydroalcoholic extract of *Plumeria pudica* Jacq. (Leaves) PPL

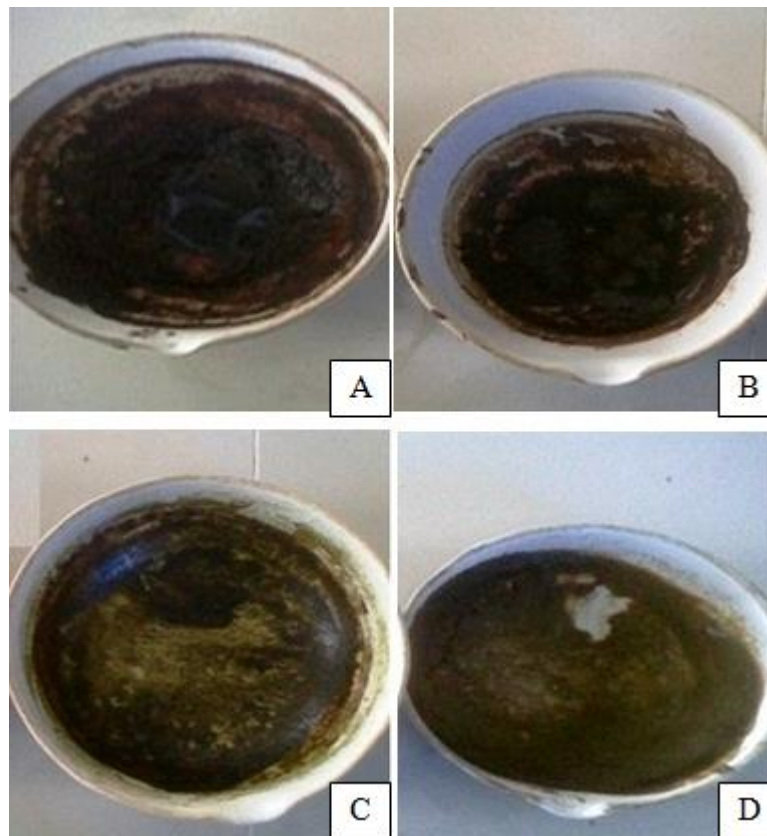
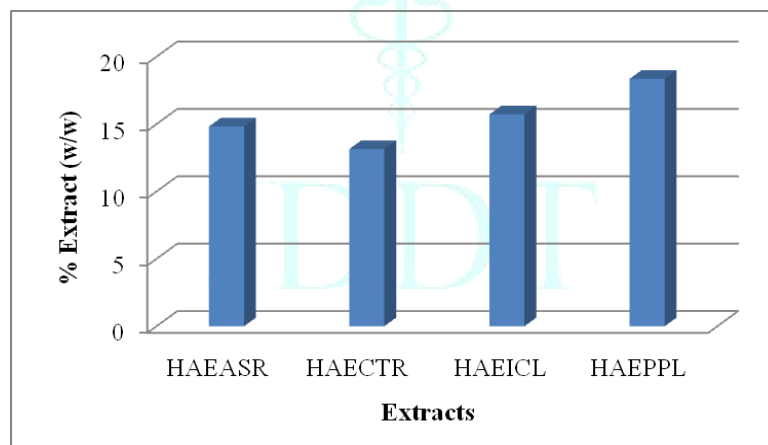


Figure 1: Hydro-alcoholic extracts of selected herbal drugs

(A=HAEASR, B=HAECTR; C=HAEICL; D=HAEPPPL)



Graph 2: Estimate percentage of the extract of selected herbal drugs

Preliminary phytochemical screening of extract

Plants have various chemical constituents and the physiological and therapeutic efficacy is the results due to various combinations of these secondary metabolites present. The constituents present in the plants clarify the uses of the plants but small fragments have been reported and investigated for the presence of active constituents in

the plants. The hydro-alcoholic extracts of dried plant material of *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were investigated for the presence of various phyto-constituents present. The qualitative tests were performed to determine the active constituents present in the extracts.

Table 5: Preliminary phytochemical screening of extract of selected herbal drugs

S/No.	Test	HAEASR	HAECTR	HAEICL	HAEPL
1.	Alkaloids	+	+	+	+
2.	Carbohydrates	+	+	+	+
3.	Tannins	-	-	-	-
4.	Steroids	-	+	+	-
5.	Triterpenoids	-	-	-	-
6.	Glycosides	-	+	-	+
7.	Gums & mucilage	-	-	-	-
8.	Fixed oil & fats	-	+	-	+
9.	Saponins	+	+	+	+
10.	Flavonoids	+	+	+	+
11.	Protein & amino acids	+	+	+	+

Note: +=Present; - = Absent

CONCLUSION

In the present investigation four herbal drugs viz., *Achyranthes aspera* Linn. (Roots) ASR, *Clitoria ternatea* Linn. (Roots) CTR, *Ipomea cairica* Linn. (Leaves) ICL and *Plumeria pudica* Jacq. (Leaves) PPL were evaluated for morphological characteristics (color, odor, taste, shape, size, surface characters and fractures) and physico-chemical parameters (foreign organic matter, loss on drying, total ash, swelling index, foaming index and extractive values). The extractions were carried using water & ethanol (70:30) and results indicated that all the extract has neutral pH and HAEPL have highest percentage of extract obtained. The hydro-alcoholic extracts were investigated for the presence of various phyto-constituents present.

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