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Sebastiania chamaelea (L.) Mull.Arg. - Phytochemical characters

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Abstract:

The preliminary phytochemical screening is the foremost step to standardize a drug and also to predict its pharmacological activities. The therapeutic uses of the drug Sebastiania chamaelea (L.)Mull.Arg have been described in Hortus Malabaricus and Yogamrutham. To give a back ground to claim its therapeutic efficacy and also to validate the profile of the drug before the scientific community, the preliminary phytochemical screening of the whole plant have been done. It includes the assessment of physicochemical parameters and estimation of phytoconstituents. It has been found that the drug contains the fiber (21.08%), total sugar (4.49%), reducing sugar (3.44%), tannin (8.5%), phenol (1.36%) and pH 3.9. the qualitative analysis of the phytoconstituents showed the presence of flavonoids, saponins, carbohydrates, tannins and steroids. The phenols. presence of these pytoconstituents can be the reason behind the therapeutic efficacy of the drug Sebastiania chamaelea (L.) Mull.Arg. and thus can look forward for the pharmacological exploration of the drug.

KEYWORDS: Sebastiania chamaelea (L.) Mull.Arg, phytochemical analysis, phytoconstituents

INTRODUCTION

The phytochemical constituents determines the pharmacological action of a medicinal plant. Medicinal plants have always played a vital role in the field of drug research. Assessing the phytoconstituent present in a medicinal helped plant assume to its pharmacological action. The drug Sebastiania chamaelea (L.) Mull.Arg. of Euphorbiaceae family is a well-known medicinal plant locally termed as Kodiyaavanakku (Malayalam). The drug was widely used in the folklore medicinal practices. The drug along with its medicinal uses have been described in the ancient scripts of Kerala like Hortus Malabaricus¹ and *Yogamrutam*.²

Sebastiania chamaelea (L.) Mull.Arg. consists 15 phenolic acids such as caffeic acid, melilotic acid, aesculetin, p-hydroxy benzoic acid, coumarin, cinnamic acid, salicylic acid and scopoletin were identified along with 5 flavonoids like myrecetin, quercetin, kaempferol, luteolin and apigenin. Methanolic extract of the leaves showed the presence of flavonoids, phenols, tannins and sterols and aqueous extract with flavonoids, phenols, glycosides, tannins, steroids and terpenoids.³ 0.5 % of the weight of the dried whole plant *Sebastiania chamaelea* (L.) Mull.Arg. is free amino acids. Of this free amino acids 77.5% were human necessary amino acids. Argenine holds the highest percentage i.e. 60% of the free amino

acids obtained.⁴ The present study aims to standardize the phytochemical profile of the whole plant *Sebastiania chamaelea* (L). Mull.Arg so as to think about the pharmacology of the drug.



Figure 1: The plant *Sebastiania chamaelea* (L.) Mull.Arg.

MATERIALS AND METHODS

A. Collection of drug

The plant *Sebastiania chamaelea* (L). Mull.Arg. was positively identified and was collected from the premises of Government Ayurveda College Tripunithura, Ernakulum, Kerala. The whole plant (including the root, stem, leaves, flowers, fruits and seeds) was collected in the month of November. Only the matured drug was collected and the fruiting of the pant was considered as the indicator of maturity.

Fresh plant collected was subjected to thorough washing to remove the physical impurities and was dried well under the shade. Properly dried plant was powdered and filtered through a sieve of 120 mesh size. This powdered drug was subjected to the preliminary phytochemical screening.

The phytochemical analysis was done at Drug Standardization Unit of Department of Dravyagunavijnanam, Government Ayurveda College, Tripunithura, Kerala.

B. Reagents

Concentrated Hydrochloric acid and acid. Hvdrochloric Xvlene. dilute Concentrated Sulphuric acid and dilute Sulphuric acid, Concentrated Nitric acid and dilute Nitric acid, Sodium hydroxide solution, Lead acetate solution, KMNO4 solution, Anhydrous Sodium carbonate, Petroleum ether, Cyclohexane, Acetone, Alcohol. Fehling's Solution A&B. Chloroform. Dragendroff's reagent. Mayer's reagent, Neutral ferric chloride, Magnesium ribbon, Methylene blue reagent, Sodium bicarbonate Copper Sulphate, Catechol, Folin catechu phenol reagent. C. Apparatus Round bottom flask, silica crucible, Dean and Stark's Clevenger's apparatus, apparatus, Soxhelet apparatus, water condensers, Buchner funnel, hot air oven, muffle furnace, Bunsen burner, heating mantle, glass beakers, Petri dishes, standard flask, measuring jars, conical flask, funnel, glass rods, watch glass, burettes, pipettes, shaker, centrifuge, Whatmann filter paper.

C. Procedure

Physicochemical parameters

The powder of the whole plant Sebastiania chamaelea (L). Mull.Arg. was assessed for various physico chemical standards like foreign matter, total ash, acid insoluble ash, water insoluble ash, volatile oil, moisture content, fibre, tannin, total sugar, reducing sugar, phenol and pH.

Qualitative analysis of Ash

The ash was subjected to qualitative analysis to confirm the presence of acid radicals carbonate, phosphate, chloride and sulphate and basic radical potassium.

Determination of Extractive values

The cold alcohol soluble, hot alcohol soluble, cold water soluble and hot water soluble extractive values of powder of the whole plant *Sebastiania chamaelea* (L). Mull.Arg. was assessed in the study.

Successive solvent extraction of the drug was also carried out using the solvents petroleum ether, cyclohexane, acetone and alcohol.

Qualitative evaluation of phytochemical parameters

Qualitative phytochemical screening was done in the extracts of the whole plant Sebastiania chamaelea (L). Mull.Arg. to assess the presence or absence of phytochemical constituents like alkaloids. flavonoids, phenols. saponins, carbohydrates, proteins, steroids and tannins.

The physical and preliminary phytochemical analysis was done by standard procedures mentioned in the Ayurvedic Pharmacopoeia of India.⁵

RESULTS:

Results obtained from the preliminary phytochemical screening of the whole plant *Sebastiania chamaelea* (L). Mull.Arg. are tabulated below.

Table 1: Physico-Chemical parameters of the whole plant *Sebastiania chamaelea* (L.) Mull.Arg.

Sl. No.	Experiments	Sebastiania chamaelea (L.) Mull.Arg.		
1.	Foreign matter	Nil		
2.	Total ash	5.79%		
3.	Acid Insoluble Ash	0.7%		
4.	Water Insoluble Ash	4.05%		
5.	Moisture Content	5.0%		
6.	Volatile oil	Nil		
7.	Fiber	21.08%		
8.	Total sugar	4.49%		
9.	Reducing sugar	3.44%		
10.	Tannin Content	8.5%		
11.	Phenol	1.36%		
12.	pH	3.9		

Table 2: Qualitative analysis of ash of the whole plant *Sebastiania chamaelea* (L.) Mull.Arg.

Sl. No.	Experiment	Sebastiania chamaelea (L.) Mull.Arg.	
Acid radicals			
1.	Carbonate	-	
2.	Phosphate	-	
3.	Chloride	-	
4.	Sulphate	+	
Basic radicals			
5.	Potassium	-	

Table 3: Extractive values (Alcohol soluble and water soluble) of the whole plant *Sebastiania chamaelea* (L.) Mull.Arg.

Sl. No.	Type of Extractives	Sebastiania chamaelea (L.) Mull.Arg.
1.	Cold Alcohol soluble	12.49%
2.	Hot Alcohol	3.5%

	soluble	
3.	Cold water soluble	12.11%
4. Hot water soluble		20.0%

Table 4: Extractive values (in different solvents) of the whole plant *Sebastiania chamaelea* (L.) Mull Arg

	entantaetea (E.) manining.				
S1.	Solvent	% of extractive			
No.		values of choorna			
		of whole plant			
		Sebastiania			
		chamaelea (L.)			
		Mull.Arg.			
1.	Petroleum	1.13%			
	ether				
2.	Cyclohexane	0.82%			
3.	Acetone	3.29%			
4.	Alcohol	0.21%			

Table 5: Qualitative phytochemical analysis of the whole plant *Sebastiania chamaelea* (L.) Mull.Arg.

Sl. No.	Experiment	Sebastiania chamaelea (L.) Mull.Arg.
1.	Alkaloids a) Dragendroff''s test	-
	b) Meyer's test	
2.	Flavonoids	+
3.	Saponins	+
	Carbohydrates	
4.	a) Fehling's test	+
	b) Benedict's test	+
5.	Proteins	-
6.	Phenols a) Ferric chloride test b) Lead acetate test	+ +

7.	Steroids	+
	Tannins	
	a) Ferric chloride	-
8.	test	+
	b) Lead acetate	
	test	

Table 6: Qualitative phytochemical analysis extractives (in different solvents) of the whole plant *Sebastiania chamaelea* (L.) Mull.Arg.

Sl	Extract	Ster	Alkal	Flavo	Phe
		oids	oids	noids	nols
Ν					
0.					
1.	Petrole	+	-	+	-
	um				
	ether				
2.	Cycloh	+	-	-	-
	exane				
3.	Aceton	+	-	+	+
	e				
4.	Alcoho	-	-	-	-
	1				

Discussion:

The detailed phytochemical analysis of Sebastiania chamaelea (L).Mull.Arg. was carried out to determine the quality and purity of the drug. The analysis revealed that there is no foreign matter present in the sample, which proves the absence of any contamination. The Total ash content of a crude drug is generally taken to be the residue remaining after incineration. It is a measure of the amount of inorganic matters (metallic salts and silica) present as impurity and thus reflects the care taken in drug preservation and the purity of crude drug. Acid insoluble ash indicates siliceous impurities present in the crude drug. Percentage of total ash, acid insoluble ash and water insoluble ash of the sample was found to be 5.79%, 0.7% and 4.05% respectively. Results of these ash values were compared to the available literature work, and the values were found to be less and within the

limit. Which infers that the percentage of impurity in the crude drug was negligible. The ash of the drug was again subjected to qualitative analysis to detect the presence of acid and basic radicals. And found the presence of sulphate.

The moisture content of the drug calculated was 5.0% which is within the permissible limit, thus it will discourage the growth of fungi and bacteria and also promote the stability of drug.⁶ The presence of volatile oil was not detected during the experiment. It might have lost while drving the drug. Qualitative and Quantitative estimation of pH of drug was evaluated. The drug turned blue litmus paper into red indicating the acidic nature and shows an acidic pH of 3.9. It was compared to the pH obtained from the literature works i.e. 3.05. This also shows that the drug was genuine and was not spoiled.

Fibre content, tannin content and phenol content of Sebastiania chamaelea (L). Mull.Arg. was found to be 21.08%, 8.5%, 1.36% respectively. Total Sugar and reducing sugar content in the drug was obtained as 4.49% and 3.44% respectively. The extractive values are useful to evaluate the chemical constituents present in the crude drug and also helpful in estimation of specific constituents soluble in a particular solvent. It also gives an indication whether the crude drug is exhausted or not. Water soluble constituents of a plant includes tannins, sugar, mucilage, glycoside, plant acids etc. Alcohol soluble constituents of a plant includes tannin, glycosides, resins etc. The extractive values such as hot alcohol extractive, cold alcohol extractive, hot water extractive and cold water extractive values were estimated in this study. The drug Sebastiania chamaelea (L). Mull.Arg. shows maximum extractive value in hot water (20%) followed by cold (12.49%) and alcohol cold water (12.11%). This suggests that the hot water can be a good solvent for preparing formulations with this drug. Further the extracts were subjected to qualitative analysis and showed the presence of saponins, carbohydrates, phenols, steroids, tannins and flavonoids.

Successive solvent extraction is done with solvents of increasing polarity from a non-polar solvent (Cyclohexane) to a highly polar solvent (Alcohol). So that maximum constituents in the drug can be extracted out into the solvents. In successive solvent extraction, the drug Sebastiania chamaelea (L). Mull.Arg. showed maximum extractive value in the solvent acetone (3.29%), followed by petroleum ether (1.13 %), Cyclohexane extractive (0.82%) and alcohol (0.21%). These extracts were then subjected to qualitative analysis for detecting the presence of phytoconstituents and the acetone extract of the drug showed the presence of maximum number of phytoconstituents i.e. steroid, flavonoids and phenol. Qualitative analysis of extractive of the sample in petroleum ether revealed the presence of steroids and flavonoids. The analysis of extractives in the cyclohexane revealed the presence of steroids only. So far the data regarding the qualitative analysis of phytoconstituents in the successive solvent extractives, are not available for a comparison.

Conclusion:

Sebastiania chamaelea The drug (L.)Mull.Arg. is a known drug among the folklore medicinal practitioners over the states of Southern India. But the drug is not a part of the Ayurvedic framework. As a prior step to validate the medicinal claims of the drug and also to establish a pharmacological profile, preliminary phytochemical screening of the drug were carried out. It revealed the presence of phytoconstituents which substantiates the therapeutic potential of the drug.

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