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Elephantopus Scaber Linn. - Phytochemical Evaluation

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ABSTRACT: -

Anachuvadi (*Elephantopus scaber* Linn.) is a perennial herb which was used to treat various conditions such as wounds, headache, insomnia, skin diseases, conjunctivitis, and mouth ulcer by the Ayurvedic physicians of Kerala. *Horthus malabaricus* by Van Rheede describes its use in mental disorders especially depression. In order to validate the traditional claim the preliminary phytochemical analysis of the drug was carried out. The preliminary phytochemical analysis aims at analysing the physiochemical property of drugs, their qualitative analysis, ash values, extractive values, moisture and volatile contents, estimation of Tannins and Phenols. On analysing the phytochemical constituents present in the crude drug, the drug revealed the presence of alkaloids, flavonoids, saponins, carbohydrates, proteins, phenols, steroids, and tannins. These phyto-constituents present in the drug may be responsible for the therapeutic potential of the drug. Apart from the findings of previous research works, qualitative analysis of ash was conducted to check the presence of acid and basic radicles. Extractive values were determined for Successive solvent extraction of *choorna* (powder) of whole plant in solvents like petroleum ether, cyclohexane, acetone and alcohol. These findings will help to ensure the genuineness, quality and purity of the drug.

Keywords-Phytochemical analysis, *Elephantopus scaber* Linn., Horthus malabaricus, *Anachuvadi*, *choorna*

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INTRODUCTION

Medicinal plants were used by man to cure the diseases from ancient times. Kerala is the land of rich biodiversity and Ayurvedic physicians of Kerala used various medicinal plants for treating various diseases. Compilation works like *Yogamrtham, Chikitsa manjari* in local languages gives clues regarding the use of plants apart from *Samhithas* and *Nighantus*. *Horthus malabaricus* is a treatise that contains botanical descriptions as well as traditional uses of plant in Malabar region by Dutch Governor of Cochin Hendrik Adrian Van Rheede tot Draakestein. *Anachuvadi* is mentioned in *Horthus malabaricus* and its use along with sugar in mental diseases especially depression is explained. It is also used in various conditions such as dysuria, dysentery and spilling of blood. *Anachuvadi* is botanically identified as *Elephantopus scaber* Linn. belongs to family Asteraceae. It is a rigid perennial herb found in moist, shady places as a weed. [1]It is having pan tropical distribution. It is used widely in clinical practise in various conditions like wounds, headache, insomnia, skin diseases, conjunctivitis, mouth ulcer, etc.[2] Apart from Kerala, plant is utilized widely in various countries such as China, Pakistan, Thailand, Brazil, Malaysia, Mauritius and Srilanka.[3] It is also used as food in various countries such as India, Africa, China and Malaysia.[4]

Extensive researches are conducting in the field of Ayurveda to validate the traditional claims scientifically and bring them to the frontline. Phytochemical evaluation is the pioneer step for the scientific validation of the pharmacological activities. Phytochemical constituents are responsible for the various pharmacological activities. Previous studies were conducted on *Elephantopus scaber* Linn. by Aruna SS [5], Anees Ahamed et al. [6], V R Mohan et al. [7], Sridhar et al. [8], Antro Jennie et al. [9], Rameen K Jamal and Vimala Jose [10] and Benil PB et al. [11] In the present study phytochemical screening of *Elephantopus scaber* Linn. is carried out to validate its therapeutic potential and to contribute more findings that will help to ensure the genuineness, quality and purity of the drug.

MATERIALS AND METHODS

Collection of drug

The plant *Elephantopus scaber* Linn. *(Anachuvadi)* was collected from the rubber plantations in Meenachil village, Kottayam district and whole plant along with its roots were collected during the month of November-December which was the flowering season of the plant. The plants that were situated in a clean place and devoid of any contamination and infestation were selected and uprooted. Identification of collected fresh whole plant was done in the Dravyaguna vijnana department, Government Ayurveda College, Tripunithura. The fresh whole plant was visually inspected for foreign matter and sorted. Then it was washed with water thoroughly to remove physical

impurities like soil, mud etc. Sufficient quantities of plants were used for macroscopical and microscopical evaluation. The remaining part was shade dried for 7 days. It was then made into fine powder and sieved through mesh with size-120. The powdered drug was stored in an air tight container and used for macroscopic and microscopic evaluation, phytochemical and pharmacological evaluation.

Fig. 1 *Elephantopus scaber* Linn.

Fig. 2 Dried *Elephantopus scaber* Linn.

Fig.3 Powder of *Elephantopus scaber* Linn.

Reagents

concentrated and dilute hydrochloric acid, xylene, concentrated and dilute sulphuric acid, concentrated and dilute nitric acid, sodium hydroxide solution, lead acetate solution, $KMnO_4$ 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.

Apparatus

Round bottom flask, silica crucible, Dean and Stark's apparatus, Clevenger's 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.

Procedure

Physicochemical parameters

The whole plant of *Elephantopus scaber* Linn.

was studied 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

Extractive values of crude drugs are useful for their evaluation, especially when the constituents of a drug cannot be readily estimated by any other means. The cold alcohol soluble, hot alcohol soluble, cold water soluble and hot water soluble extractive values of the whole plant of *Elephantopus scaber* Linn. was evaluated in the study. Successive solvent extraction of the drug was also carried out using the solvents petroleum ether, cyclohexane, acetone and alcohol.

Phytochemical parameters

Preliminary phytochemical screening was done to confirm the presence or absence of phytochemical constituents alkaloids, flavonoids, phenols, saponins, carbohydrates, proteins, steroids and tannins. Petroleum ether, cyclohexane, acetone and alcohol extracts of whole plant of *Elephantopus scaber* Linn. were subjected to qualitative analysis for analysing the presence of steroids, alkaloids, flavonoids and phenols. The physical and preliminary phytochemical analysis was done by standard procedures mentioned in the Ayurvedic Pharmacopoeia of India.

RESULTS

Table No: 1 Physico-Chemical Parameters Of *Choorna* (Powder) of *Elephantopus Scaber* Linn.

Sl no.	Parameters	Results
1	Foreign matter	Nil
2	Total ash	5.76%
3	Acid Insoluble Ash	4.57%
4	Water Insoluble Ash	3.3%
5	Moisture Content	5%
6	Volatile oil	Nil
7	Fibre	26.06%
8	Tannin Content	21.25%
9	Total sugar	7.78%
10	Reducing sugar	1.81%
11	Phenol	3.8%
12	pH	5.88

Table No: 2 Qualitative Analysis Of Ash of *Choorna* (Powder) of *Elephantopus Scaber* Linn.

Sl no	Experiment	*choorna* (powder) of *Elephantopus scaber Linn.*
1	Carbonate	+
2	Phosphate	-
3	Chloride	+
4	Sulphate	+
5	Potassium	-

Table No: 3 Extractive Values (Water Soluble And Alcohol Soluble) of *Choorna (Powder)* of *Elephantopus Scaber* Linn.

Sl No	Type of Extractives	*choorna (powder)* of *Elephantopus scaber Linn.*
1	Cold water soluble	9.34%
2	Hot water soluble	15.2 %
3	Cold alcohol soluble	6.74%
4	Hot alcohol soluble	7.6%

Table No: 4 Extractive Values (In Different Solvents) of *Choorna* (Powder) of *Elephantopus Scaber* Linn.

Sl no	Solvents	*choorna* (powder) of *Elephantopus scaber Linn.*
1	Petroleum ether	2%
2	Cyclohexane	8%
3	Acetone	4%
4	Alcohol	3%

Table No: 5 Qualitative Phytochemical Analysis Of *Choorna* (Powder) of *Elephantopus Scaber* Linn.

Sl.no	Experiment	*Choorna* (powder) of *Elephantopus scaber* Linn.
1	Alkaloids Dragendroff's test	+
	Meyer's test	+
2	Flavonoids	+
3	Saponins	+
4	Carbohydrates Fehling's test	+
	Benedict's test	+
5	Proteins	+
6	Phenols Ferric chloride test	+
	Lead acetate test	+
7	Steroids	+
8	Tannins Ferric chloride test	+
	Lead acetate test	+

Table No: 6 Qualitative Phytochemical Analysis Of Solvent Extracts Of *Choorna* (Powder) of *Elephantopus Scaber* Linn.

Sl no	Extract	Steroids	Alkaloids	Flavonoids	Phenols
1	Petroleum ether	+	-	-	-
2	Cyclohexane	-	+	-	+
3	Acetone	-	+	-	-
4	Alcohol	+	+	+	+

DISCUSSION

The present study showed the absence of foreign matter in powdered drug which indicated the purity of the drug. Ash values are important indices to illustrate the quality as well as purity of the drug. The ash content or ash value is the residue remaining after incineration of the drug. Ash value represents the amount of inorganic matter present in the drug. The total ash, acid insoluble ash and water insoluble ash are the three different methods used to determine the ash value. The measurement of total amount of material remaining after ignition gives the total ash value. The measurement of silica present in the drug especially as sand and siliceous earth is acid insoluble ash, which is part of total ash.

Water insoluble portion of total ash forms the water insoluble ash. The total ash value of *choorna* of *Elephantopus scaber* Linn. was found to be 5.76%. Total ash mainly represents the inorganic salts and impurities like sand, soil etc. present in the drug. Out of two previous research works, the ash value obtained was found to be comparable with the findings of Benil PB et al and found to be lesser in value. Hence it will ascertain the purity of drug. The acid insoluble ash value was 4.57%. The water insoluble ash values of the *choorna* were found to be 3.3%. Out of two research works, values obtained were found to be similar to findings of Benil PB et al. Volatile oil content was absent and the moisture content was 5% in the drug. The moisture content obtained in the previous research work by Aruna was high(78%) due to the use of whole plant in wet form. Low moisture content ensures the long shelf life of the powder. The fibre content was estimated as 26.06% and found to be more than the value obtained by Benil PB et al(15.2). This may be due to climatic changes. Tannin, phenol, total sugar and reducing sugar were estimated as 21.25%, 3.8%, 7.78% and 1.81% respectively. Previous studies conducted in whole plant were not available for the comparison. The qualitative ash analysis of *choorna* of *Elephantopus scaber* Linn. was conducted to detect the presence of acid and basic radicals. The powdered drug showed the presence of carbonate, chloride and sulphate and absence of phosphate and potassium. Previous references were not available regarding the qualitative ash analysis of the drug. pH of the drug was estimated as 5.88 and was almost similar to the value estimated by Benil PB et al. (5.65). The drug turned blue litmus paper into red which indicates its acidic nature.

Water soluble constituents of a plant include tannins, sugar, mucilage, glycoside, plant acids etc. Alcohol soluble constituents of a plant include tannins resins etc. So according to the presence of constituents and their polarity solvents for extraction was selected. Low extractive value indicates adulteration of herbal drug with exhausted material, any fault during processing, drying or storage. Hot and cold alcohol soluble extractives, hot and cold water soluble extractives were estimated or *choorna* of *Elephantopus scaber Linn*. Hot water soluble extractive value was found to be 15.2%. Cold water soluble extractive value was 9.34%. Hot alcohol soluble extractive value was 7.6%. Cold alcohol soluble extractive value in powdered drug was 6.74%. Water soluble extractive values were higher than alcohol soluble extractives. Hence this indicates that maximum amount of active principles were extracted in the water soluble extractives. Out of two research works regarding extractive values, values obtained were comparable with the findings of Benil PB et al. Successive extraction with solvents of increasing polarity is used to extract various compounds of a wide polarity range. The extractive values of *choorna* of *Elephantopus scaber* Linn. obtained in the successive solvent extraction were 2 % in petroleum ether, 8% in cyclohexane, 4% in acetone and 3% in alcohol. References regarding successive solvent extractive values were not found in literature. Qualitative analysis of successive solvent extractives of *choorna* of *Elephantopus scaber* Linn. was analysed and Steroids were present in petroleum ether and alcohol extract. Alkaloids were present in cyclohexane, acetone, and alcohol. Flavanoides were present in alcohol extract. Phenols were present in alcohol, cyclohexane extract. Triperpenes were present in cyclohexane and acetone extracts.

Qualitative analysis of crude drug was evaluated in *choorna* of *Elephantopus scaber* Linn and revealed the presence of alkaloids, flavonoids, saponins, carbohydrates, proteins, phenols, steroids and tannins. Out of four available references, the result obtained was comparable with the findings of Antro Jennie et al.

CONCLUSION

The use of *Elephantopus scaber* Linn. in mental diseases especially in depression by Ayurvedic physicians in Kerala is mentioned in Horthus malabaricus which is a treatise that describes medicinal plants and their uses. In order to validate the traditional claim and to standardize the drug, its phytochemical analysis was carried out which revealed the presence of valuable phytoconstituents which accounts for the therapeutic potential of the drug. Apart from the findings of previous research works, qualitative analysis of ash was conducted to check the presence of acid and basic radicles. Extractive values were determined for Successive solvent extraction of *choorna* (powder) of whole plant in solvents like petroleum ether, cyclohexane, acetone and alcohol. These findings will help to ensure the genuineness, quality and purity of the drug.

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