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PHARMACOGNOSTICAL AND PHYTOCHEMICAL ANALYSIS OF ASPARAGUS *RACEMOSUS* WILLD, ANISOMELES *MALABARICA* (L) R.Br, *Cleome monophylla L.*, and *Coleus forskohlii L.*

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ABSTRACT

Medicinal plants constitute the major bioactive compounds of most indigenous medicines and a large number of medicinal preparations which contain one or more ingredients of plant origin. For thousands of years people have utilized herbs for health care. The herbal products today symbolize safety in contrast to the synthetics that are regarded as unsafe to human and environment. Pharmacognostical studies help in the identification and authentication of the plant compounds isolated from various parts of plants. This preliminary information is necessary for standardization of the plant material used in the formulation of drugs. In the present study, the pharmacognostic and phytochemical analysis of Asparagus racemosus root, Anisomeles malabarica leaf and whole plant of Cleome monophylla and Coleus forskohlii were carried out. The results of the present investigation are significant and encouraging towards the goal for future utilization and standardization of above plants.

KEY WORDS

Medicinal plants, Anisomoles, Pharmacognostical and Phytochemical studies, Asparagus, Cleome and Coleus, Phytochemistry, Ethanol, Methanol, Ethyl Acetate.

1. INTRODUCTION

There have been enormous scientific reports as the plants are important source of Medicinal compounds to cure various human and animal diseases (Mahesh and Satish, 2008). According to the World Health Organization (WHO), the current survey suggests that many developed countries have a high proportion of the populations, making use of traditional practice of health, especially the use of various parts from medicinally important plants (WHO, 1999). A large number of medicinal plants and their purified constituents have shown that the beneficial therapeutic potentials and exhibits antioxidant activity, anti-diabetic activity etc. due to the presence of various phytochemical compounds like flavones, isoflavones, flavanoides, anthocyanin, coumarin, lignans, catechins, phenolic compounds etc. (Shelef, 1983; Zaika, 1988; Das et. al., 2011). The healing power of medicinal plants has a long established history. For thousands of years people have utilized herbs for health care. The widespread use of herbal remedies and health care preparations, as those described in ancient texts such as the Veda and the Bible has been traced to the occurrence of natural products with medicinal properties. Civilized societies have bequeathed myths and compendiums of healing herbs and the herbal remedies from people of preliterate societies continue to surprise us with their extensive green pharmacy (Balick, 1996 and Cox, 1994). Traditional Chinese medicine was brought to Japan via Korea, and Chinese-influenced Korean medicine was adapted by the Japanese during the reign of Emperor Ingyo (411-453A.D).

The Indian subcontinent, with the history of one of the oldest civilization, harbors many traditional health care systems. One of the ancient classics, “Charak Samhita” (Chandra and Sharma, 1986) is the oldest text available on the complete treatment

of diseases which specifies the use of hundreds of herbs in the complete treatment of diseases. The Ayurveda, whose history goes back to 500 B.C., is one of the ancient health care systems, which is a potential source of indigenous drugs. A large number of such herbs are mentioned in "Bhavprakash" (Vaishya, 1835) as well as "Aryavaidhya Kalanidhi" (Kavade Krishnamurthi, 1986). "Indian MateriaMedica" (Nadkarni, 1976) also gives a large number of medicinal plants for the treatment of various diseases.

Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolise safety in contrast to the synthetics that are regarded as unsafe to human and environment. Pharmacognostical studies help in the identification and authentication of the plant material. They include the sensory, morphological, microscopic, macroscopic and physico-chemical characteristics of the plant. This preliminary information is necessary for the standardization of the plant material and to ensure that only genuine and uniform material is used in the formulation of drugs. In the present study the pharmacognostic and phytochemical analysis of four medicinal plants were studied through standard procedure. The plant parts like leaf, root, stem and whole plants were used for extraction of biocompounds for further experimental study. The results were discussed and the conclusion arrived for future course of action.

2. MATERIALS AND METHODS

2.1 Collection of plant material

Mature, fresh and healthy plant materials were used for macroscopic evaluation. The Plants were collected from Jawathu hills of Tiruvannamalai district, Tamil Nadu. The careful observations of above collected plants were done according to standard procedure (WHO, 2002).

2.2 Microscopic Study

Microscopic analysis of leaf, stem, petiole and root was carried out using semi-permanent preparations (Johansen, 1940). The anatomical features were described as given in the published literature (Esau, 1964 a, b).

2.3 Pharmacognostic Study

The different Plant parts collected as leaf, stem, whole plant, etc. were analysed for the following pharmacognostic parameters.

2.3.1 Organoleptic Evaluation

Organoleptic characters such as colour, size, odour, taste and texture were observed based on the description by Wallis (1985).

2.3.2 Physico-Chemical Evaluation

Disease-free plant parts (root, stem and leaf) were shade dried, powdered and stored in airtight containers. Physico-chemical evaluation of samples for foreign matter, loss on drying, total ash, acid insoluble ash tests were carried out by employing standard methods as per WHO guidelines (Anonymous, 1998; Indian Pharmacopoeia, 1996). The extractive values (alcohol and water soluble) of the powdered drug were determined according to the procedure described by Mukherjee (2002).

The various physicochemical parameters like ash values, and extractive values were performed as per the standard procedures. (Various sensory parameters of the plant material, such as size, shape, colour, odour, and taste of the stem were recorded). In physical evaluation, moisture content, ash values viz., total ash, acid insoluble ash, and extractive values viz., alcohol soluble extractive value, water soluble extractive values were determined. The ash value represents the inorganic salts present in the drug. Extracts obtained by exhausting crude drugs are indicative of approximate measures of certain chemical compounds they contain, the diversity in chemical nature and properties of contents of drug. The determinations were performed in triplicate and results are expressed as mean ± SD. The percentage w/w values were calculated with reference to the air-dried drug.

2.3.3 Qualitative Evaluation of Phytochemicals

In order to identify the efficacy of the vegetative parts (stem, leaf and root) of the plant, the extracts were prepared separately using polar and non-polar solvents.

A. Preparation of plant material

The mature vegetative parts of plants were collected and shade dried completely, then used for extraction. The stem, leaf and root of the plant were separately cut and air-dried at room

temperature upto seven days and pulverized in mortar and pestle. The powdered samples were sieved into fine powder and stored in an air-tight zip bags. The extracts were prepared using soxhlet apparatus using non polar solvents. The aqueous solvents extracts were prepared using lyophilizer. The residues were lyophilized to get dry solid mass.

B. Solvents used for extraction

The orders of solvents used for extraction of plant materials were Chloroform, Ethanol, Methanol, Ethyl Acetate and Water.

C. Extract preparation

The powdered plant parts were extracted using Chloroform, Ethanol, Methanol, Ethyl Acetate and Water by sequential extraction (1:4, w/v). The crude extract of the plant parts were prepared in soxhlet apparatus. The plant parts such as stem, root and leaves were dried, powdered and weighed. Powdered plant parts (50 gm) were soaked in 200 ml of organic solvent using soxhlet apparatus. Briefly the extraction was carried out at room temperature until exhaustion. The extracts were filtered and air dried at 40°C. The weight of each dry residue was recorded. The crude extract was reconstituted with Dimethyl sulphoxide (DMSO) whenever used. All extracts were prepared and stored at 4°C until used.

D. Screening of Phytochemicals

The concentrated extracts were subjected to qualitative tests for the identification of alkaloids (Mayer's test and Dragendorff's test), carbohydrates (Molish's, Fehling's and Benedict's test), glycosides (Borntrager's test), proteins (Millions test), saponins (Foaming test), phenols (Ferric chloride, Gelatin and Lead acetate test) and flavonoids (Ammonia test) as per the standard procedures described by Harborne (1984), Sofowara (1993) and Trease and Evans (1997). The intensity of the coloration determines the abundance of the compound present.

3. RESULTS AND DISCUSSION

i. Physical parameters

The macroscopical characters of different plant parts from *Asparagus racemosus* root, *Anisomeles malabarica* leaf, whole plant of *Cleome monophylla* and *Coleus forskohlii* were given in Table 1. The leaf parameters such as vein islet number, vein termination number and stomatal index were shown in Table 2.

ii. Physico-chemical analysis

The physico chemical constants such as ash values, loss on drying, water soluble extractive, alcohol soluble extractive and crude fibre content were given in the Table 4.

iii. **Phytochemical Analysis**

The plant extracts of *Asparagus racemosus* root, *Anisomeles malabarica* leaf, whole plant of *Cleome monophylla* and *Coleus forskohlii* from different solvents like petroleum ether, ethyle acetate, alcohol and chloroform-water were subjected to preliminary phytochemical screening. The presence of phyto-constituents from the above plants was presented in the Table 5. The fresh leaves and shade dried leaves were subjected to hydro distillation separately and the presence of volatile oil has been reported in the Table 3.

Table 1: Macroscopical characters of Leaf of *Anisomeles malabarica,* Root of *Asparagus racemosus,* Whole plant of *Cleome monophylla* and *Coleus forskohlii*

S.No.	Chara-cter	Observation			
		Leaf of *Anisomeles malabarica*	**Root of *Asparagus racemosus***	**Whole plant of *Cleome monophylla***	**Whole plant of *Coleus forskohlii***
1.	Shape	Upper surface-pale green, lower surface-greenish white	Fresh root – fleshy, tuberous, tapering ends, swells in water	Whole plant smooth powder	Fresh powder pale green in colour, dried powder greyiesh green in colour
2.	Odour	Aromatic, pleasant	Characteristic odour	Characteristic odour	characteristic odour
3	Size	5-7 cm long, 3-4.5 cm wide	10-60 cm length, 1-2.5 cm wide	-	-
4	Surface & Shape	Soft,wooly, Oblong-lanceolate	Rough, sign of shrinkage after drying	-	-
5	Colour	Upper surface-pale green, lower surface-greenish white	Fresh roots are white to buff colour, dried roots are white to greyish white in colour	Fresh powder pale green in colour, dried powder greyiesh green in colour	Fresh powder pale green in colour, dried powder greyiesh green in colour
6	Texture	Simple	Short and fibrous	-	-
7	Taste	Slightly bitter	Slightly bitter	Slightly bitter	Slightly acrid

Table 2: Leaf parameters of *Anisomeles malabarica*

S.No	Parameters	Maximum	Minimum	Average
1.	Vein islet no.	16.0	11.0	13.5
2.	Vein termination no.	18.0	12.0	14.7
3.	Stomatal index upper and lower surface	12.0 & 10.0	7.4 & 6.5	9.7 & 8.0

Table 3: Volatile oil content of *Anisomeles malabarica* leaves

S.No.	Materials	Percentage of yield	colour
1	Fresh leaves	2.56	Pale yellow
2	Shade dried leaves	1.62	Pale yellow

Table 4: Physico-chemical constituents of Leaf of *Anisomeles malabarica,* Root of *Asparagus racemosus,* Whole plant of *Cleome monophylla,* Whole plant of *Coleus forskohlii*

S.No.	Physical costent	Average % of Physico-chemical constants			
		Leaf of *Anisomeles malabarica*	**Root of *Asparagus racemosus***	**Whole plant of *Cleome monophylla***	**Whole plant of *Coleus forskohlii***
1	Total ash	2.13	7.67	3.67	1.23
2	Water soluble ash	0.72	2.53	1.53	2.22
3	Acid insoluble ash	1.06	1.02	2.04	2.04
4	Sulphated ash	5.68	-	-	-
5	Loss on drying	5.43	3.94	2.04	1.11
6	Water soluble extractive	10.87	5.14	3.14	0.78
7	Alcohol soluble extractive	16.28	6.65	2.15	1.67
8	Crude fibre content	14.66	2.04	1.03	1.03

Table 5: Phytochemical screening of extracts of Anisomeles *malabarica* leaves, *Asparagus racemosus* root, Whole plant of *Cleome monophylla* and *Coleus forskohlii*

S.No	Phyto chemicals	Petroleum ether				Ethyl acetate				Alcohol				Chloroform –Water			
		Am	Ar	Cm	Cf	Am	Ar	Cm	Cf	Am	Ar	Cm	Cf	Am	Ar	Cm	Cf
1	Alkaloids	-	-	+	+	+	-	+	+	+	-	+	+	-	-	+	+
2	Sugar	-	-	-	+	-	-	-	+	+	-	-	+	+	-	-	+
3	Tannin	-	-	+	+	-	-	+	+	+	-	+	+	+	-	+	+
4	Protein	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Steriod	+	+	-	+	+	+	-	+	-	+	-	+	-	+	-	+
6	saponin	-	-	+	+	-	-	+	+	+	+	+	+	+	+	+	+
7	lignin	-	-	+	+	-	-	+	+	+	-	+	+	+	-	+	+

+ = presence; - **=**Absence; **Am**-*Anisomeles malabarica* leaves, **Ar**-*Asparagus racemosus root*, Whole plant of **Cm**-*Cleome monophylla* and **Cf**-*Coleus forskohlii.*

4. CONCLUSIONS

The present finding of Phytochemical screening of the plant extract confirmed the presence of several bioactive compounds like alkaloids, flavones, tannins and phenols which could be responsible for the versatile medicinal properties of these plants. The botanical characters, physical constants, presence of compounds including the volatile oil content of the leaves of *Asparagus racemosus* root; *Anisomeles malabarica* leaf and whole plant of *Cleome monophylla and Coleus forskohlii* were presented.

These data will serve as a reference for the quality control of the preparations from the above plants. From various research reports, it is found that the plant *Asparagus racemosus* is used widely to cure various diseases. Thus the present investigation is in the line with earlier reports and found to be significant and encouraging towards the goal for standardization. This result of *Coleus forskohlii* can be useful for preliminary screening of potential anti-arthritis plants. This study clearly indicates that list of medicinal plants analysed may be useful to for medicinal formulations after perform the clinical studies.

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REFERENCES

1. Mahesh, B and S.Sathish (2008). Antimicrobial activity of some important medicinal plant agaimstplannd human pathogens. World journal of Agricultural science. Vol. 4: 839.
2. World Health Organization, (1999). Monographs on selected medicinal plants. Vol. 1.
3. Shelef, L.A (1993). Antimicrobial effects of spices. Journal of Food Safety. Vol. 6: pp. 29-44.
4. Zaika, L.L (1998). Spices and herbs: Their antimicrobial activity and its determination. Journal of Food Safety. Vol.9: pp. 97-111.
5. Das, J.K., C.Kandar, S.P.Dey, and S.C.Mandal, (2011). Evaluation of nalagesic activity of Clerodendrumviscosum Linn. (Verbenaeceae) Leaves on experimental animal model. Intternational Journal of Pharma and Sciences. Vol. 2: (2). Pp. 345-349.
6. Balick,MJ.,and Cox, PA. (1996). Plants, People and Culture: *The Science of Ethnobotany*. New York: Scientific American Library.
7. Cox, PA., Balick, MJ. (1994). The ethnobotanical approach to drug discovery. *Sci. Am*., 270: 60-65.
8. Chandra, KA., Sharma, P. (1986). "CharakSamhita". Vol. I to IV, Delhi. Sri Satguru Publications.
9. Vaishya, L. (1835). "Bhavprakash", ShriVenkateshwar (steam) Mudranalaya, Mumbai.
10. KavadeKrishnamurthi, GG. (1986). "Aryavaidyakalanidhi", Shri Venkateshwar(steam) Mudranalaya, Mumbai.
11. Nadkarni, AK. (1976). Indian Materia Medica, Vol. I to II, Popular PrakashanPvt. Ltd., Mumbai.
12. World Health Organization (WHO) (2002). General guidelines for methodologies on research and evaluation of traditional medicine, Geneva.
13. Johansen, DA. (1940). *Plant Microtechnique*. McGraw Hill book Co. Ltd. Newyork.

14. Esau, K. (1964a). *Plant Anatomy*. John Wiley and Sons, New York.
15. Esau, K. (1964b). *Anatomy of Seeds*. John Wiley and Sons, New York.
16. Wallis, TE. *Text Book of Pharmacognosy*. CBS Publishers & Distributors, Shahdara, Delhi 32, 1985.
17. Anonymous. (1998). *Quality Control methods for Medicinal Plant materials*. World Health Organisation, Geneva. pp. 25-30.
18. *Indian Pharmacopoeia*. (1996). Government of India, ministry of Health and Family Welfare, Controller of Publications, New Delhi. pp. A53-A55.
19. Mukherjee, PK. (2002). *Quality control of Herbal Drugs – An approach to evaluation of Botanicals*, Business Horizons Pharmaceutical Publishers, New Delhi. p.400.
20. Harbone, JB. (1984). *Phytochemical investigation of certain medicinal plants*, 2nd edition, Chapman & Hall, London, 37-40.
21. Sofowora, A. (1993). Screening Plants for Bioactive Agents. *Medicinal Plants and Traditional Medicine in Africa*. 2nd Ed. Spectrum Books Ltd., Sunshine House, Ibadan, Nigeria, pp. 134-156.
22. Trease, GE and Evans, WC. 1997. *Pharmacognosy,* 4th edition. W.B. Saunders Company, U.K., 218.

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