IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS)
e-ISSN: 2278-3008, p-ISSN:2319-7676. Volume 10, Issue 3 Ver. II (May - Jun. 2015), PP 24-27
www.iosrjournals.org

Phytochemical content of the leaf, stem and root of *Micrococca mercurialis* (L.)Benth. A promising herb.

Sai Prasanna C. G*., Poongani .M* and Karpagam .S**
**Research Scholars , Department of Botany, Queen Mary's College, Chennai -4.*
*** Associate Professor of Botany, Queen Mary's College, Chennai – 4.*

Abstract: *The drug evaluation and bioassay of traditional herb has gained more importance in the world of pharmacognosy. Plants which are available in our locality has to be studied and registered for their medicinal uses, that gains more value in the scientific field. One among them is Micrococca mercurialis (L.) Benth with vernacular name pulladi(tamil) a small herb belonging to the family Euphorbiaceae. This herb has ethanobotanical importance in curing sores, rheumatic pain and constipation. Phytochemical analysis of this plant was done in four solvents namely petroleum benzine, chloroform, acetone and methanol separately with leaves, stem and root. The phytochemical screening analysis showed the presence of alkaloids, phenols, amino acids, diterpenes terpenoids, proteins, oxalate, cardiac glycosides, xanthoproteins, anthocyanin and saponin.*
Keywords: *constipation, pharmacognosy, phytochemical analysis, rheumatic pain, solvents, sores.*

I. Introduction

The medicinal plants are useful for healing as well as for curing of human diseases because of the presence of phytochemical constituents [1,2]. Phytochemicals are naturally occurring in the medicinal plants in all the parts namely, leaves, stem and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents and secondary compounds have terpenoid, alkaloids and phenolic compounds [1,3]. Terpenoids exhibit various important pharmacological activities i.e.,anti-inflammatory,anti-cancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities [1,4].Terpenoids are very important in attracting useful mites and consume the herbivorous insects [1,5]. Alkaloids are used as anaesthetic agents and are found in medicinal plants [1,6].

Phytochemicals from plants have desirable biological activities [7].Plants have limitless ability to synthesize aromatic substances like phenols,or their oxygen- substituted derivatives. Most of the natural products are their secondary metabolites, which serves as defense mechanism against predation and protection from microorganism, insects and herbivores [8].

The use of plants and plant extract for pharmaceutical purposes has been reported by various authors and researchers.Many plants, whole and parts, and their products have been used in folklore medicine since ancient time for curing human ailments. Hence it is the urgent need to study the various pharmaceutical applications of medicinal plants and harvest the important potential of these plants in various human pathologies.

M.mercurialis is an erect or procumbent herb up to 50 cm tall. Stem crisped – pubescent in rows. Petioles are 0.5 to 2.5 cm long. Leaf blades are 2-7 × 1-3.5 cm, elliptic- ovate, subcute or obtuse apically, crenate and rounded at base. Stipules are glandular 0.5 cm long. Inflorescence is 1 - 7.5 cm long, unisexual flowers, female flowers are pedicellate 1-5 mm long extending to 3 cm in fruit, sepals long, ovate– lanceolate , acute, ovary 2 or 4 lobed. Fruits are rounded 3 lobed rarely 4 lobed, dark green or bluish- green becoming dull purple on drying.

II. Materials And Methods

2.1 Collection and authentication of plant material

The plant was collected in Queen Mary's College campus and sea shore side of Marina Beach (Chennai- 4) .The collected plants were identified by Prof. P Jayaraman, Director, Plant Anatomy Research Centre (PARC) Chennai – 45.

2.2 Plant material

The collected plant material was separated as leaves, stem and root. All the material were washed under running tap water thoroughly, shade dried for 15 to 20 days and grounded into fine powder and stored separatively in a air tight container.

2.3 Preparation of extract

Each sample of 10 g were taken and soaked for 24 h in 30 ml of methanol, acetone, chloroform and petroleum benzine separately. The extracts were filtered using Whatman filter paper 1, evaporated to dryness and re-dissolved in the equal volume of its respective solvent. The extracts were stored at 4°C for future use.

2.4 Phytochemical analysis

The phytochemicals present in each part of the plant was analysed by standard methods of Harborne. The alkaloids are determined by Wagner's test [8], carbohydrate by Benedict's test [8], saponin by foam test, phenols by ferric chloride test, flavonoids by lead acetate test, diterpenes by copper acetate test, terpenoids by Salwoski's test, aminoacids by ninhydrin test, proteins by biuret test, xanthoproteins by conc, HNO_3 test, cardiac glycosides by Kellerkillani synthesis, anthocynanin by HCl and NH_3, leucoxanthanin by isoamyl alcohol, carboxlic acid by effervescence test.

III. Result And Discussion

Micrococca mercurialis (L.) Benth leaf, stem and root were extracted with four different solvents namely acetone, chloroform, methanol and petroleum benzine and the results are presented in Table 1 and 2. The stem extract showed more number of secondary metabolites. Leaf extracts of acetone, chloroform and petroleum benzine showed rich oxalate, cardiac glycosides, fewer xanthoproteins. Successful determination of biologically active compound from plant is largely on the type of solvent used in the extraction procedure. Properties of a good solvent used in plant extraction includes low toxicity, ease to evaporate at low heat, promotion of rapid physiologic absorption of the extract, preservation action, and inability to cause extract to complex or disassociate [8,9,10] As the end product in extraction will contain traces of residual solvent, the solvent should be non toxic and should not interfere with bioassay.[8,9,11]

The plant is rich in saponins and it has anticancer activities [8]. It was observed that methanol extract of M. mercurialis leaf has alkaloids, flavonoids, reducing-sugars, tannins, saponins and anthroquinones and similar results were reported earlier [16].

Methanol separates polyphenols. They have unipolar character to release polyphenols from cells. It has high polarity which helps to detect flavonoids, it easily penetrates cellular membrane [8]. Acetone dissolves many hydrophilic and lipophilic components from the plants. It is a useful extractant for antimicrobial studies where more phenolic compounds are required to be extracted. It is used to extract tannins, phenols, saponin[8]. Chloroform is used to extract terpenoids lactones [8]. Petroleum benzine [ether] is commonly used selectively for the extraction of coumarins and fatty acids [8]

The stem extracts possess almost all the phytochemicals that are tested here when compared to leaf and root. The stem is rich in phenols and proteins in the methanol and acetone extracts. Chloroform and petroleum benzene extracts shows presence of alike compounds .

Root of M.mercurialis has same phytochemical compounds as that of leaf and stem in all the four solvents. Chloroform extract showed the presence of anthocyanin.

From the above results it is eminent that the stem and root of the four solvent extractions has more phytochemicals than its leaf extracts. The phytochemical analysis shows that the plant is rich in xanthoproteins, terpenoids, cardiac glycosides, oxalate, saponin, anthocynanin and alkaloids. These phytochemicals helps us to know that the Micrococca mercurialis possess antidiarrhoel, antihelmintic, anticancerous activities of the plant and various biological active compounds [8].

Table 3.1– Phytochemical content of leaf, stem and root of Micrococca mercurialis.

S.no	Phytochemical test	References	Leaf				Stem				Root			
			Me	Ac	Ch	P	Me	Ac	Ch	P	Me	Ac	Ch	P
1.	Alkaloids (Wagner's test)	Prashant Tiwari et al.,2011 . [8]	-	-	-	-	+	-	++	+	++	-	++	++
2	Carboxylic acid (Effervescence test)	Suman Kumar et al.,2013. [12]	-	-	-	-	-	-	-	-	-	-	-	-
3.	Saponins (Foam Test)	Prashant Tiwari et al.,2011 .[8]	+++	+++	-	-	+++	+++	-	+++	+++	+++	-	+++
4.	Phenols (Ferric chloride)	Prashant Tiwari et al.,2011 .[8]	-	-	-	-	+	+	-	-	-	-	-	-
5.	Flavonoids (Lead Acetate)	Prashant Tiwari et al.,2011 .[8]	-	-	-	-	-	-	-	-	-	-	-	-

6	Carbohydrates (Benedict's test)	Prashant Tiwari et al.,2011 .[8]	+++	-	-	-	-	-	-	-	-	-	-	-
7.	Amino acids (Ninhydrin test)	Prashant Tiwari et al.,2011 .[8]	-	-	-	-	+	-	-	-	-	-	-	-
8	Protein (Biuret test)	Zakia Khanam et al., 2014.[13]	-	-	-	-	++	++	-	-	++	++	-	-
9	Xanthoproteins (Conc.HNO_3, NH_3)	Suman Kumar et al.,2013. [12]	-	-	++	-	++	-	+	+	-	-	+++	+
10.	Terpenoids (Salwoski's Test)	Zakia Khanam et al., 2014. [13]	+++	+	+	-	+++	++	-	+++	+++	+++	+++	++
11.	Diterpenes (Copper acetate)	Prashant Tiwari et al.,2011 .[8]	++	+	-	-	+	++	-	-	++	+++	-	-
12.	Oxalate (Ethanoic acid glacial)	Solomon Charles Ugochukwu et al.,2013. [14]	-	+++	+++	+	-	++	+	-	-	-	-	-
13.	Cardiacglycosides (Kellar kiliani synthesi)s	Chandra Shekar Misra et al.,2011 . [7]	-	++	-	++	-	-	++	+	-	-	-	++
14.	Anthocyanin (Hcl and NH_3)	Ashvin Godghate et al., 2012 [15]	-	-	-	-	-	-	-	-	-	-	++	-
15.	Leucoanthocyanin (Isoamyl alcohol)	Ashvin Godghate et al., 2012 [15]	-	-	-	-	-	-	-	-	-	-	-	-

Me – Methanol , Ac – Acetone, Ch - Chloroform, P – Petroleum benzine, '+' = stands for mild presence , ' ++' = moderately present , '+++' = strongly present and '–'= stands for absence.

Table 3.2 Phytochemicals extracted with different solvents.

S.no	Solvents	Leaf	Stem	Root
1	Methanol	Diterpenes, Terpenoids, Saponin.	Alkaloids, Phenols, Amino acids, Diterpenes, Terpenoids , Proteins, Xanthoproteins. Saponin.	Alkaloids , Diterpenes, Terpenoids Protein, Saponin.
2	Acetone	Diterpenes, Terpenoids, Oxalate. Cardiac glycosides. Saponin.	Phenols , Diterpenes, Terpenoids , Proteins, Oxalate . Saponin.	Diterpenes, Terpenoids, Protein, Saponin.
3	Choloroform	Terpenoids, Oxalate, Xanthoproteins.	Alkaloids, Oxalate , Cardiac glycosides.	Alkaloids , Terpenoids, Anthocyanin, Xantho proteins.
4	Petroleum benzine	Oxalate , Cardiac glycosides. Saponin.	Alkaloids , Terpenoids, Cardiac glycosides, Xantho proteins . Saponin	Alkaloids, Terpenoids, Cardiacglycosides, Xantho proteins, Saponin.

IV. Conclusion

The pharmacological potency of this plant is evident by its phytochemical content, results of this study persuade the researchers more towards its component isolation, viability as drug in the field of medicine.

Acknowledgements

The authors acknoweledge R. Banumathy, Head of Department of Botany, Queen Mary's College , Chennai - 4 for permitting to do the work in the laboratory.

References

[1]. Abdul Wadood1*, Mehreen Ghufran1, Syed Babar Jamal1, Muhammad Naeem1, Ajmal Khan2, Rukhsana Ghaffar3 and Asnad1. Phytochemical Analysis of Medicinal Plants Occurring in Local Area of Mardan. Biochemistry &Analytical Biochemistry Wadood Biochem Anal Biochem 2:4 2013,. http://dx.doi.org/10.4172/2161-1009.1000144.

[2]. Nostro A, Germanò MP, D'angelo V, Marino A, Cannatelli MA Extraction methods and bioautography for evaluation of medicinal plant antimicrobial activity. Lett Appl Microbiol 30: (2000) 379-384.

[3]. Krishnaiah D, Sarbatly R, Bono A Phytochemical antioxidants for health and medicine: A move towards nature. Biotechnol Mol Biol Rev 1: (2007) 97-104.

[4]. Mahato SB, Sen S (1997) Advances in triterpenoid research, 1990-1994.Phytochemistry 44: 1185-1236.

[5]. Kappers IF, Aharoni A, van Herpen TW, Luckerhoff LL, Dicke M, et al Genetic engineering of terpenoid metabolism attracts bodyguards to Arabidopsis. Science 309 (2005) : 2070-2072.

[6]. Hérouart D, Sangwan RS, Fliniaux MA, Sangwan-Norreel BS Variations in the Leaf Alkaloid Content of Androgenic Diploid Plants of Datura innoxia.Planta Med 54: (1988) 14-17.

[7]. Chandra Shekar Misra, Kumar Pratyush, Lipin Dev M.S, Joel James, Arun Kumar Thaliyil Veeettil and Thankamani V. A comparative study on phytochemical screening and antibacterial activity of roots of Alstonia scholaris with the roots , leaves and stem bark. Int. J. Res. Phytochem. Pharmacol., 1 (2), 2011. 77-82.

[8]. Pranshant Tiwari, Bimlesh Kumar, Mandeep Kaur, Gurpreet Kaur, Harleen Kaur. Phytochemical screening and Extraction : A Review. International Pharmaceutica Sciencia;1 (1): 2011.99- 106.

[9]. Das K, Tiwari RKS, Shrivastava DK. Techniques for evaluation of medicinal plant products as antimicrobial agent: Current methods and future trends . Journal of Medicinal Plants Research: 4(2): 2010.104-111.

[10]. Hughes I (2002). Isoprenoid compounds and phenolic plant constituents, Elsevier, New York, N.Y.Sci.Afr.Mag.9(56).

[11]. Ncube N. Afolayan SAJ, Okoh Al. Assessment techniques of antimicrobial properties of natural compounds of plant orgin: current methods and future trends. Afr. J. Biotechnol.7(12): (2008)1797-1806.

[12]. R.Suman Kumar, C. Venkateshwar, G.Samuel, S. Gangadhar, Phytochemical Screening of some compounds from plant leaf extracts of Holoptelea integrifolia (Planch.) and Celestrus emarginata (Grah.) used by Gondu tribes at Adilabad District, Andrapradesh, India.International Journal of Engineering Science Invention. Vol.2 (2), 2013. 65-70.

[13]. Zakia Khanam, Chew Shwu Wen , Irshad UI Haq Bhat. Phytochemical screening and antimicrobial activity of root and stem extracts of wild Eurycoma longifolia Jack (Tongkat Ali) . Journal of King Saud University – Science .; 2014.1-8.

[14]. Solomon Charles Ugochukwu , Arukwe Uche I. and Onuoha Ifeanyi. Preliminary phytochemical screening of different solvent extracts of stem bark and roots of Dennetia tripetala G. Baker . Asian J. Plant Sci. Res.,3 (3): 2013.10-13.

[15]. Ashvin Godghate , Rajaram Sawant and Ashok Sutar.Phytochemical analysis of ethanolic extract of roots of carrisa carandus linn.rasayan J.Chem.,vol.5, No.4: 2012.456-459.

[16]. Sutapa Choudary, Chowdary Habibur Rahaman, Sudhendu Mandal. Micrcocca Mercurialis Benth – Pharmacognostic Analysis and Antimicrobial Activity of an Folk Medicinal Plant. Journal of Biology, Agriculture and Healthcare. vol.4, No.27, 2014.122-128.