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Research Article

Studies on Phytochemical and Antioxidant potential of certain medicinal plants from Udayagiri Hill Range, Andhra Pradesh, India.

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Abstract: A study was conducted on the phytoconstituents and antioxidant potential of crude extracts of Ethanol, methanol and water (aqueous) of 14 plant parts (botanicals) of 10 plant species. Phytochemical screening and antioxidant potential were carried out using standard procedures.
Keywords: *Limonia alata, Commiphora caudata,* Rutaceae, Eastern Ghats, Udayagiri hills, Phytoconstituents, free radicals, antioxidant potential.

INTRODUCTION

Nature is an extraordinary treasure-house of various valuable resources. There is no illness, for which the nature does not offer a panacea. Humans have been dependent on natural resources, mostly plants for nutrition and medicinal needs, since time immemorial. The emergence of plant based drugs in the modern era stands testimony to the fact that they are safe without side effects. The importance of botanical, chemical and pharmacological evaluation of plant derived agents used in the treatment of human ailments has been increasingly recognized in the last decades. The general belief among the people is that the herbal based products and medicines will not have harmful side-effects, unlike synthetic chemical drugs.

Medicinal plants have been used in traditional treatments for numerous human diseases for thousands of years and they continue to be an important therapeutic aid for alleviating the ailments of human kind [1]. Secondary metabolites of plants play an important role in human health and also nutritionally important [2]. The phenolic compounds are one of the largest and most ubiquitous groups of plant secondary metabolites. Phytochemical screening of various plants revealed the presence of different secondary metabolites like alkaloids, flavonoids, steroids, phenols, glycosides, saponins etc [3,4].

Medicinal plants are very good source of antioxidants, since they synthesize secondary metabolites like alkaloids, flavonoids etc. Antioxidants are also known as "Free radical scavengers", compounds that either reduce the formation of free radicals or react with and neutralize them. Antioxidants often work by donating an electron to the free radical before it can oxidize other cell components. Once the electrons of the free radical are paired, the free radical is stabilized and becomes non-toxic to cells. Antioxidant is a substance capable of inhibiting oxidation, which can neutralize free radicals before they can do harm and may help undo some damage already caused to some specific cells.

Antioxidants are substances that protect the cells against the effects of free radicals as they donate their electrons to free radicals. When a free radical gains an electron from an antioxidant, it gets stabilized and thereby never damage cells further [5]. A number of studies have been focused on the biological activities of phenolic compounds, which proved as antioxidants and free radical scavengers [6-8].

Natural antioxidants include phenolic compounds (tocopherals, flavonoids and phenolic acids), nitrogen compound (alkaloids, chlorophyll derivatives, aminoacids and amines), carotenoids and ascorbic acid [9]. Phenols are one such class of secondary metabolites in turn classified into many groups such as flavonoids, isoflavones, anthraquinones, coumarins and catechins. In literature, it has been stated that these molecules are potent antioxidants [10].

The present study is aimed to find out suitable plant species that possess phyto constituents exhibiting anti oxidant activity due to the presence of various phenoloic compounds.

MATERIALS AND METHODS

A) Collection of Plant materials

Limonia alata,W&A; *Commiphora caudata*, (W&A). Engl ; *Cardiospermum macrocarpum* (Kunth.); *Mucuna atropupurea*, DC; *Delonix elata*,(L). Gamble; *Hemidesmus indicus*, (L).Schult*; Strychnos* nux-*vomica*,Linn*; Strychnos potatorum*, Linn *; Anisomeles indica*,(L).Kuntz and *Gyrocarpus americanus*, Jacq.were collected from Udayagiri hill range, situated in the Southern most part of the Eastern Ghats, Nellore District of Andhra Pradesh. Plant materials collected were washed with distilled water, shade dried, pulverized and stored in polythene bags.

B) Phytochemical screening

The extract of the plant powdered samples was prepared by soaking 20 g of samples in 100 ml of ethanol, methanol and water for 48 h. The procedure was repeated. At the end of each repetitive extraction, the extracts were filtered using Whatman 1 filter paper. The filtrate was concentrated under reduced pressure in vacuum at 40°C for 25 min using a rotary evaporator (Super fit-ROTAVAP, India). Phytochemical screening for phytoconstituents was evaluated through standard procedures as described by Harborne [11] and Trease and Evans [12].

C) Antioxidant potential

The ability of the plant extracts from different solvents to annihilate the stable DPPH radical (1,1-diphenyl-2-picrylhydrazyl) was investigated by the method described by Blois [13]. Stock solution of each extract was prepared to the concentration of 1mg/ml. Various concentrations (50µg, 100µg 150µg) were prepared and to each extracts was added an equal volume of methanolic solution of DPPH (0.1mM). The reaction mixture is incubated for 30 min at room temperature; the absorbance was recorded at 517 nm. The procedure was repeated three times. The Methanol with respective plant extracts serves as blank. The lower the absorbance, the higher is the antioxidation potential. The percentage inhibition of the radical scavenging activity was calculated from the absorbance of corresponding blank and sample values according to formula given below.

Percentage of Inhibition = (A blank – A sample) /A blank * 100

RESULTS AND DISCUSSION

Phytochemical constituents

In the present study, phytochemical screening was carried out in 14 plant parts of 10 plant species. The presence or absence of the large and diverse group of chemicals such as alkaloids, terpenoids, flavonoids, phenols, tannins, quinines, glycosides, saponins anthraquinones, phlobatannins, steroids, phytosteroids, carbohydrates and cardiac glycosides were recorded. Table -1 presents the phyto constituents available in various plant parts (botanicals) with different extracts in ethanol, methanol and water. Each plant has its specific set of phytoconstituents. Normally the predominant group among these is terpenoids, which account for more than 1/3 of known compounds. The second largest group is formed by alkaloids comprising of many drugs and poisons [14]. Even in the present study, the predominant compound terpenoid is present in all plant parts. Similarly, the second predominant group alkaloids and coumarins are present in all the plant parts except *Delonix elata* (leaf). Except, *Hemidesmus indicus* (leaf &flower) and *Strychnos potatorum* (leaf), all other remaining plant parts contain flavonoids and another significant compound. Cardiac glycosides are also abundant in all the plant parts except *Limonia alata* (leaf). Steroids and phytosteroids are also common in their occurrence in many botanicals, except for the fruit of *Strychnos potatorum* and the leaf of *Gyrocarpus americanus*. The other phytoconstituents such as phenols, tannins, carbohydrates quinines and saponins were less prevalent. Whereas, anthraquinones, phlobatannins and glycosides were totally absent.

Phytochemical screening of various plants revealed the presence of different secondary metabolites like alkaloids, flavonoids, steroids, phenols, glycosides, saponins etc. [3,4]. The phytochemical analysis carried out by Akki *et al.*, [9] revealed that leaves of certain plants contain alkaloids, glycosides, sterols, tannins, flavonoids and carbohydrates. Similar results were observed in the present study not only in the leaves but also in flowers and fruits of different plant species.

Antioxidant potential

The Percentage of Inhibition of DPPH with different plant extracts is presented in Table-2 The present study is aimed at finding out the potential herbs for the antioxidant potential via screening them using biochemical assays and to validate the same by the presence of plant phenols in them.

Among the 14 plant parts of 10 plant species screened, the strongest antioxidant activity was shown by *Hemidesmus indicus* (flower -Methanol 96.58%) followed by *Mucuna atropupurea* (Flower-Methanol 92.99%), *Anisomeles indica* (flower- Methanol 92.26%; leaves-Methanol 92.08%), *Commiphora caudata* (fruit – Methanol 85.43%) *Cardiospermum macrocarpum* (leaf -aqueous-78.13%) and *Strychnos* nux-*vomica* (leaf-aqueous 66.24%). The interesting feature to note in the present study is that the Limonia *alata* (leaf), *Delonix elata* (leaf and flower), *Strychnos potatorum* (leaf and fruit) and Gyrocarpus *americanus* (leaf) showed less percentage inhibition and proved as weak antioxidants. The data suggests that the extractability of the ntioxidant compounds from most of the botanicals is

better in methanol than ethanol and water (aqueous). But the % inhibition was significant with the aqueous extracts in the case of *Cardiospermum macrocarpum* (leaves 78.13%), *Hemidesmus indicus* (flower 87.20%) and *Anisomeles indica* (leaves 67.61%). Invariably, in majority of plant parts, the percent inhibition value of aqueous extracts is less when compared to other extracts. The data obtained suggest that the compounds present in plant parts exhibit high solubility in Methanol and Ethanol.

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REFERENCES

1. Momin RK, and Kadam VB; Determination of ash values of some medicinal plants of genus *Sesbania* of Marathwada region in Maharashtra. Journal of Phytology, 2011, 3: 52–54.
2. Jeeva S, Sheela JD, Shamila RMI, Lekshimi PJ, Brindha RJ; Antimicrobial activity and phytochemical analysis of *Sanseiveria roxburghiana* leaf. Asian Journal of Plant Science Research, 2012, 2: 41–44.
3. Mojab F, Kamalinejad M, Ghaderi N, Vahidpour HR; Phytochemical screening of some species of Iranian plants. Iranian Journal of Pharmaceutical Research, 2003; 2: 77–82.
4. Parekh J, Chanda S; Phytochemical screening of some plants from Western region of India. Plant Archives, 2008; 8: 657–662.
5. Hagerman AN, Rield KM, Jones GA, Sovik KN, Ritchard NI, Hartzfeld PW, Riechel TL; High molecular weight plant polyphenols (tannins) as biological antioxidants. Journal of Agricultural and Food Chemistry, 1998; 46: 1887–1892.
6. Evans RC, Miller NJ, Bolwell GP, Bramley PM, Pridham JB; The relative antioxidant activities of plant-derived polyphenolic flavonoids. Free Radical Research, 1995. 22: 375-383.
7. Cespedes C.L, EI- Hafidi M, Pavon N, Alarcon J; Antioxidant and Cardio-protective activities of phenolic extracts from fruits of Chilean blackberry *Aristotelia chilensis*, Magui (Elaeocarpaceae). Food Chemistry, 2008; 107: 820–829.
8. Reddy BS, Reddy BP, Raghavulu SV, Ramakrishna S, Venkateswarlu Y, Diwan PV; Evaluation of antioxidant and antimicrobial properties of *Soymeda febrifuga* leaf extracts. Phytotherapy Research, 2008, 22: 943–947.
9. Akki KS, Krishnamurthy G, Bhoja-Naik HS; In-vitro evaluation of *Ctinodaphne hookeri* leaf extract for antioxidant property. Medicinal Plants, 2010; 2: 125–130.
10. Ivanova D, Gerova D, Chervenkov T, Yankova T; Polyphenols and antioxidant capacity of Bulgarian medicinal plants. Journal of Ethnopharmacology, 2005; 96: 145–150.
11. Harborne JB; Phytochemical Methods: A guide to modern techniques of plant analysis. Chapman and Hall, New York, pp. 279, 3rd Edition, 1973.
12. Trease, GE; Evans WC; Pharmacognsy. 11th edn. Brailliar Tiridel Can. Macmillian publishers, 1989.
13. Blois MS; Antioxidant determinations by the use of a stable free radical, Nature, 1958; 29: 1199-1200.
14. Verpoorte R, van der Heijden R, ten Hoopen HJC, Memelink J; Metabolic engineering of plant metabolite pathways for the production of fine chemicals. Biotechnology Letters, 1999; 21: 467-479.

Table – 1. Phytoconstituents present in various plant parts with different extracts

S. No	Plant species	Plant Part	Extract	Tan	Alk	Cou	Fla	Ter	Phe	Car Gly	Sapo	Gly	Qui	Ph.tan& Aq	Ste& Phy	Carb	Carb
01	Limonia alata	Leaf	Ethanol		+	+	+										
			Methonol														
			Aqueous		+	+	+	+							S+		
02	*Commiphora caudate*	Fruit	Ethanol		+	+	+	+	+	+	+		+		S+		
			Methonol		+	+	+	+	+	+	+		+				
			Aqueous	+				+		+			+		S+		+
03	*Cardiospermum macrocarpum*	Whole Plant	Ethanol	+	+	+	+	+		+					P+		
			Methonol		+	+	+			+	+				P+		
			Aqueous		+	+	+	+		+					P+		
04	*Mucuna Atropurpurea*	Flower	Ethanol	+	+	+	+	+		+	+		+				
			Methonol		+	+	+		+	+							
			Aqueous		+	+			+				+		P+		
05	*Delonix elata*	Leaf	Ethanol				+			+					S+		
			Methonol				+			+							
			Aqueous	+				+					+		S+	+	
	Delonix elata	Flower	Ethanol			+	+	+		+					P+		+
			Methonol		+	+	+	+		+					S+	+	
			Aqueous		+			+		+							
06	*Hemidesmus indicus*	Leaf	Ethanol		+	+		+		+						+	
			Methonol			+		+		+						+	
			Aqueous	+				+		+			+		S+	+	
	Hemidesmus indicus	Flower	Ethanol		+	+		+		+			+				
			Methonol					+		+			+				
			Aqueous					+		+			+		S+		
07	*Strychnos nux vomica*	Leaf	Ethanol		+	+		+		+					S+		
			Methonol		+	+		+		+					S+		
			Aqueous		+	+	+	+		+	+				S+		
08	*Strychnos potatorum*	Fruit	Ethanol		+			+			+						
			Methonol							+			+				
			Aqueous		+	+	+			+							
09	*Strychnos potatorum*	Leaf	Ethanol		+			+			+						+
			Methonol							+			+				
			Aqueous		+	+	+			+							
	Anisomeles indica	Flower	Ethanol			+	+	+		+	+		+		S+		
			Methonol			+	+			+	+						
			Aqueous					+		+					P+	+	
09	*Anisomeles indica*	Whole Plant	Ethanol		+		+			+							
			Methonol				+	+		+	+						
			Aqueous	+	+	+		+		+	+				S+		
10	*Gyrocarpus americanus*	Leaf	Ethanol		+	+	+	+			+						
			Methonol		+		+			+						+	
			Aqueous	+	+	+	+	+		+			+			+	

+ Present; Tan-Tannins: Alk-Alkaloids; Cou-Coumarins; Fla-Flavonoids ; Ter -Terpenoids; Phe-Phenols; Car. gly- Cardiac glycosides; Sapo-Saponins; Gly - Glycosides; Qui - Quinones; Ph.tan&Aq –Phlobatannins; Anthraquinones; Ste&Phy- Steroids&Phytosteroids; Carb – Carbohydrates;

Table -2: Percentage inhibition of DPPH with different plant extracts

S. No	Plant species	Plant Part	Concentration of extracts	% Inhibition with Ethanol Extract	% Inhibition with Methanol Extract	% Inhibition with Aqueous Extract
01	*Limonia alata*	Leaf	50µg	7.2	10.08	2.24
			100µg	5.2	7.79	17.41
			150µg	5.2	6.67	4.38
02	*Commiphora caudate*	Fruit	50µg	45.12	24.74	26.15
			100µg	57.81	63.43	34.24
			150µg	77.24	85.43	35.25
03	*Cardiospermum*	Leaf	50µg	8.63	3.33	28.88
			100µg	12.91	17.12	78.13
	macrocarpum		150µg	9.59	24.52	22.58
04	*Mucuna*	Flower	50µg	77.93	65.58	24.87
			100µg	91.38	82.79	37.68
	atropurpurea		150µg	91.60	92.99	39.49
05	*Delonix elata*	Leaf	50µg	16.49	13.88	5.28
			100µg	23.11	23.44	11.92
			150µg	9.08	25.60	7.97
	Delonix elata	Flower	50µg	7.95	22.07	12.33
			100µg	17.93	37.46	37.85
			150µg	19.12	57.02	28.97
06	*Hemidesmus*	Leaf	50µg	11.00	0.46	68.73
			100µg	29.61	13.84	70.82
	indicus		150µg	13.90	24.24	83.73
	Hemidesmus	Flower	50µg	89.83	96.58	87.20
			100µg	83.48	93.22	85.19
	indicus		150µg	82.42	93.74	58.36
07	*Strychnos nux*	Leaf	50µg	7.20	19.55	27.44
			100µg	19.86	30.96	17.80
	vomica		150µg	26.90	42.17	66.24
08	*Strychnos*	Fruit	50µg	1.83	2.54	3.56
			100µg	5.04	15.58	8.48
	potatorum		150µg	14.19	25.54	10.82
	Strychnos	Leaf	50µg	1.55	2.55	46.00
			100µg	5.50	12.00	3.80
	potatorum		150µg	12.19	20.60	31.45
09	*Anisomeles*	Leaf	50µg	91.37	89.74	67.61
			100µg	88.95	92.08	55.87
	indica		150µg	79.98	89.35	31.52
	Anisomeles	Flower	50µg	29.62	55.33	8.24
			100µg	59.93	90.43	16.21
	indica		150µg	91.28	92.26	26.91
10	*Gyrocarpus*	Leaf	50µg	5.23	13.88	5.28
			100µg	8.24	23.44	11.92
	americanus		150µg	13.88	25.60	7.97