INTERNATIONAL RESEARCH JOURNAL OF PHARMACY **ISSN 2230 – 8407**
Available online http://www.irjponline.com
Research Article

EVALUATION OF ANTIBACTERIAL AND ANTIOXIDANT PROPERTIES OF *UVARIA NARUM* (DUNAL) WALL.

Padyana Subrahmanya[1]*, Ashalatha M[2], Prajna P. S[3], Yende Ashutosh[3], Bhat Rama[3]
[1]Department of Post Graduate Studies in Dravyaguna Vijnana, Alva's Ayurveda Medical College, Moodbidri, Karnataka, India
[2]Department of Post Graduate Studies in Dravyaguna Vijnana, Government Ayurveda Medical College, Bangalore, Karnataka, India
[3]Post Graduate Department of Biotechnology, Alva's College, Moodbidri, Karnataka, India

Article Received on: 15/03/2011 Revised on:20/04/2011 Approved for publication:01/05/2011

*Dr. Subrahmanya Padyana M.D.(Ayu.), Assistant Professor, Department of Post Graduate Studies in Dravyaguna Vijnana, Alva's Ayurveda Medical College, Moodbidri – 574227 Dakshina Kannada District, Karnataka, India
Email: drsp28@gmail.com

ABSTRACT
A study was conducted on an Ethnomedicine which is commonly used in skin disease in the Dakshina Kannada District of Karnataka State. The antibacterial and antioxidant potential of the root of *Uvaria narum* (Dunal) Wall. has been carried out by using various extracts. The estimation of polyphenols, proteins, carbohydrates and tannins were also carried out. The root powder showed remarkable degree of antioxidant activity, and antibacterial properties against *Staphylococcus aureus, Escherichia coli, Lactobacillus fermentum* and *Bacillus* spp.
KEY WORDS: *Uvaria narum* (Dunal) Wall, Proteins, Carbohydrates, Polyphenols, Tannins, Antibacterial, Antioxidant

INTRODUCTION

Since time immemorial human being has made use of plants in different ways and also used plants as a source of medicine. India has a valuable heritage of herbal remedies for various ailments. In India vast populations of rural people still depend to a greater extent on the indigenous systems of medicine[1]. Some of the ethnomedicines have been incorporated in the organized system of medicine. However, much larger number of etnomedicines have remained confined to certain pockets of the foothills of the Western Ghats in the Dakshina Kannada District of Karnataka State. The *Uvaria narum* (Dunal) Wall., locally known as Karimaderi in Kannada and Kakkepandel in Tulu is one such plants available in the Western Ghat foothills. The roots of the plant are being used both internally and externally in the various types of skin diseases mainly to treat Eczema and Pityriasis. The plant is also being used to treat Constipation, Low back ache, Jaundice, Fever [2].

The plant is a large woody stellately pubescent, stragling shrub with dark bluish green leaves. Leaves alternate, distichous oblong-lanceolate, acute, glabrous, shining above; petioles short. Flowers solitary, terminal, reddish, 2.5-3.7 cm in diameter; pedicels 2.5-3.8cm long. Sepals 3, orbicular-ovate, connate at the base. Petals usually 6, sometimes7-8, ovate, connate at base. Berries globose-cylindrical, red when ripe. Seeds ovoid or compressed, light brown[3].

Upon searching in the literature, it has been documented that Acetogenins, including stereoisomers are important constituents of the root bark of this plant[4]. The detailed phytochemical, antioxidant and antimicrobial properties have not been found documented for whole root of the plant especially from Western Ghats. The available only literature in the data base on the *U. narum* discusses medicinal property of the root bark taken from plants of Malabar region. However there is dearth of information on the whole root extracts being used from the plants taken from Western Ghat region. Therefore baseline information on the plant's medicinal properties generated on scientific grounds would help us in exploring the herb for better utilization in treating the ailments.

MATERIALS AND METHODS

Collection of the Plant material

The roots of the plant *U. narum* were collected from the Kalanjimale Range, Bantwal Taluk, D.K. District of Karnataka and were authenticated by the expert Botanists. A voucher specimen of the plant (AAMC/SP/28) is deposited in the herbarium of the Department of P.G. Studies in Dravyaguna, Alva's

Ayurveda Medical College, Moodabidri. The roots were washed thoroughly with water, shade dried and coarsely powdered.

Preparation of sample extract

The dried coarse powder of the roots was subjected to exhaustive extraction in water, ethanol, methanol, petroleum ether, acetone and chloroform separately by using Soxhlet apparatus. Standards methods as described in Indian Pharmacopoeia were followed for the extraction[5]. These extracts were vacuum dried, weighed and preserved at 4 °C in air tight container for further use.

Preliminary phytochemical analysis

The sample extracts were subjected to qualitative analysis to detect the presence of various Phyto constituents like Carbohydrates, Proteins, Starch, Alkaloids, Flavonoids, Triterpenoids, Phenolics, Elagic acid, Tannins, Saponins, Resins and Steroids following the standard biochemical methods[6].

Quantitative analysis of the Phyto-constituents

Quantitative analysis of some of the key parameters *viz.,* Carbohydrates, Proteins, Tannins and Phenols were carried out. The Carbohydrates were estimated by following the standard Anthrone method[6] and Protein by Lowry's method[6]. The amount of Phenolic component in the extract were determined using Folin-Ciocalteu (FC) Reagent using pyrocatechol as standard[6] and Tannins were estimated following Folin-Denis method[7].

Antioxidant activity

For determining antioxidant capacity of the plant material, FRAP assay[8] using standard 250 µg concentration of water extract were prepared and about 1 ml of each sample was treated with 3ml of FRAP reagent and absorbance was read at 593nm in U.V. Spectrophotometer (Elico.SL159). The antioxidant activity of the extract was compared with standard ascorbic acid (200µM-2000µM).

Antibacterial activity

Antibacterial activity of the sample was analyzed by standard tube dilution procedures[9] with required modifications. About 2ml of sterile Luria Bertani (LB) Broth were separately inoculated with 20 µl of laboratory cultures of *Staphylococcus aureus, Escherichia coli, Bacillus spp.* and *Lactobacillus fermentum*. To each of the tube containing different test organism 200 µl of plant extract was added. Control tubes containing inoculum, without inoculum, with test drug and without test drug were also maintained. All the tubes were incubated at 37 °C for 24 hours and growth as turbidity was compared among tubes.

RESULTS

The percentage yield of plant root from various extraction procedures are given in table 1 and phytochemical parameters are listed in table 2. The quantitative data on total protein, carbohydrates, phenolics and tannins are given in table 3. The water extract of the plant *U. narum* whole root powder showed an antioxidant activity to a tune of 523.70 uM (Fe)/ gm root powder and is shown in the table 3. The ethanol extract of the plant whole root extract when incorporated into the culture, inhibited the growth of *Staphylococcus aureus, Escherichia coli, Bacillus spp.,* and *Lactobacillus fermentum* showing its potent antibacterial activity against both Gram positive and Gram negative bacteria and is shown in the table 3.

DISCUSSION

Uvaria narum is a medicinal plant widely distributed in foot hills of Western Ghats and is popularly used in ethnomedicine for the treatment of eczema and pityriasis. To complement the use of the plant in Indian system of medicine a scientific data on basic phytochemical constituents are useful. Accordingly whatever data generated in this piece of preliminary work would go a long way in further characterizing the plant's potential as a candidate herb in Indian system of medicine for treating skin diseases.

The plant showed the presence of phenols, tannins, antioxidants and antibacterial activity to a remarkable level. The presence of these phytoconstituents in plants have been attributed to various medicinal properties in plants like anticancer, antioxidant and antimicrobial activities as has been documented in literature for various plants[8,10, 11, 12, 13]. Similarly, the present work also documents presence of tannins and phenols in the plant root *U. narum* which could be attributed to its antioxidant and antibacterial activity.

Antioxidative activity was found in the plant *U. narum* whole root extract to a tune of 523.70 uM (Fe)/ gm root powder and is remarkable when compared in the literature. This activity may be attributed to the presence of 0.8% of phenols in the whole root powder as antioxidative activaties are directly proportional to phenolic compounds in plants. Therefore the whole root extracts of the plant *U. narum* could be medicinally employed as a possible free radical scavenger. The plant may also be considered against ageing and other disease caused by free radicals.

In case of antibacterial activity, the plant showed inhibitory properties against both Gram positive and Gram negative bacteria namely, *Staphylococcus aureus, Escherichia coli, Bacillus spp.* and *Lactobacillus ferment.* The presence of antibacterial activities among herbs is not uncommon when especially they are used as

drug to treat skin diseases. Therefore it is not surprising to have this plant possess antibacterial activity against a wide range of bacterial species as the plant has been in use as a drug to cure skin ailments. Therefore the plant could be used to control eczema and other skin disease caused by bacterial infections.

The present study is the first one to document the antioxidant and antibacterial activity for the whole root extracts of the plant *U. narum* taken from Western Ghats region. The present work further necessitates the chemical analysis of these phytochemical constitutes to reach at a conclusive evidence to show which fractions are responsible for each of the medicinal properties and further work is in progress.

REFERENCES

1. Singh V. Indian Folk Medicines And Other Plant Based Products. Jodhpur(India): Scientific Publishers; 2001.
2. Bhat Satyanarayana. Janapada Vaidyadalli Sasya Vaividhya(Kannada). Bangalore: MRL Infotech Service; 2004.
3. Bhat Gopalakrishna K. Flora of Udupi. Udupi: Indian Naturalist; 2003.
4. Padmaja V, Thankamany V and hisham A. Antibacterial, anfifungal and athehlmintic activities of root barks of Uvaria hookeri and Uvaria narum. Journal of ethonopharmacology, 2002; 40: 181-186
5. Anonymous. Indian Pharmacopoeia. New Delhi: The Controller of Publishers Department of H & FW Govt. of India; 2007. Vol 2. p.ix
6. Sadasivam S and Manickam A. Biochemical methods. 3rd ed. New Delhi: New age international(P) Ltd., Publishers; 1991. p.45-47
7. Thimmaiah SK. Standard methods of Biochemical analysis. New Delhi: Kalyani Publishers; 1994.
8. Adedapo AA, Jimoh FO, Koduru S, Masika PJ and Afolayan JA. Antibacterial and antioxidant properties of the methanol extracts of the leaves and stems of Calpurnia aurea. J BMC Complement Altern Med, 2008; 8:53
9. Chitwood AL. Tube Dilution Antimicrobial Susceptibility Testing: Efficasy of a microtechnique applicable to diagnostic laboratories. Applied Microbiology, 1969; 17(5):707-709
10. Ghalem BR and Mohamed B. Antimicrobial activity evaluation of the oleoresin oil of Pistacia vera L. African Journal of Pharmacy and Pharmacology, 2009; 3(3):92-96
11. Basim E, Basim H and Ozcan M. Antibacterial activities of Turkish Pollen and propolis extracts against Plant bacterial pathogens. Journal of Food Engineering, 2006; 77: 992-996
12. Adeyemi AI, Omonigbehin EA, Stella S, Oluwatosin O and Jumoke S. Antibacterial activity of extracts of Alchornea cordifolia (Schum and Thonn)Mull.Arg., Boerhavia diffusa (L) and Bridellia micranthal (Hoscht.) Baill. used in traditional medicine in Nigeria on Helicobacter pylori and four diarrhoeagenic bacterial pathogens. African Journal of Biotechnology, 2008; 7(20):3761-3764
13. Ara N and Nur H. In vitro antioxidant activity and of methanolic leaves and flower extracts of Lippia alba. Res J Med Medicinal Science, 2009; 4(1):107-110

Table.1. Yield for various extracts of whole root of *U. narum*

Solvents	Percentage of the extract
Water	13.84%
Ethanol	6.64%
Methanol	8.88%
Petroleum Ether	2.08%
Acetone	4.54%
Chloroform	7.20%

Table 2. Phyto-chemical analysis of whole root extracts of *U. narum*

Sl. No.	Phyto-chemical Tests	Observations	Inference
1.	Carbohydrates		
	a. Benedict's test	Coloured precipitate	Positive
	b. Fehling's test	Red precipitate	Positive
	c. Molisch's test	Red-violet ring	Positive
2.	Protein		
	a. Biuret's test	Red colour	Positive
	b. Millon's test	White precipitate	Positive
3.	Starch	No blue colour formation	Negative
4.	Alkaloids		
	a) Dragendorff's test	Orange-red precipitate	Positive
	b) Mayer's test	Pale yellow precipitate	Positive
5.	Flavonoids	Brown colour	Positive
6.	Triterpenoids: a) Liebermann-Burchard's test	No violet coloured ring	Negative
7.	Phenolics	Bluish-black colour	Positive
8.	Elagic acid	Canine-red colour	Positive
9.	Tannins	Brown colour	Positive
10	Saponins	Honey comb like froth persisting more than 5 minutes	Positive
11	Resins	Presence of turbidity	Positive
12	Steroids		
	a) Liebermann-Burchard's test	Greenish turns to blue colour	Positive
	b) Salkowski Reaction	Formation of red colour	Positive

Table 3. Quantitative analysis of phytochemicals of whole root extracts of *U. narum*

Sl. No.	Quantitative Methods	Results
1	Estimation of Carbohydrate	27.30%
2	Estimation of Proteins	15.12%
3	Estimation of Phenols	0.8%
4	Estimation of Tannins	3.0%
5	Antioxidants	523.70 uM (Fe)/ gm root powder
6	Antibacterial activity against *Staphylococcus aureus, Escherichia coli, Bacillus spp.* and *Lactobacillus fermentum*	Present

Source of support: Nil, Conflict of interest: None Declared