

PROXIMATE AND PHYSICOCHEMICAL ANALYSIS OF *DENDROBIUM MACROSTACHYUM* LINDL

NIMISHA.P.S* AND HIRANMAI YADAV.R

Department of Biotechnology, Karpagam University, Coimbatore, Tamil Nadu, India 641021. Email: nimisha.pulikkal@gmail.com

Received: 2 Sep 2011, Revised and Accepted: 19 Oct 2011

ABSTRACT

The present study was designed to determine the physicochemical parameters, phytochemical screening, organoleptic identification and fluorescence analysis on dried powder of *Dendrobium macrostachyum* Lindl. The detailed pharmacognostic or phytochemical evaluation of this plant has not been reported earlier. Total ash, water soluble ash, acid insoluble ash were observed to be respectively 6.5%, 4.12%, 0.83% for stem and 3.80%, 1.69%, 0.67% for leaves. Preliminary phytochemical analysis revealed the presence of alkaloids, leaf flavonoids, glycosides, sterols, tannins and phenols.

Keywords: *Dendrobium macrostachyum* Lindl, Physicochemical evaluation, Preliminary phytochemical analysis

INTRODUCTION

The use of medicinal herbs for many ailments is an age-old practice. Considerable interest has been evinced by the scientists from divergent fields regarding the use of indigenous drugs from natural products with an eye to find novel structures and distinct biological activities. Elegant orchid plants belonging to the family Orchidaceae represents more than 17,000 known wild species in 750 genera in the world^{1, 2}. Besides their ornamental values, orchids wield an enigmatic charm and are the most popular in the horticultural industry, due to their big, eye-catching, colourful and durable flowers.

Dendrobium is a cosmopolitan genus, comprising more than 1100 species, among which most of them have been investigated for their medicinal properties. The dried or fresh stems of *Dendrobium* plants have been used in traditional or folk medication as stomachic, pectoral, analgesic and anti-pyretic medication³. Recent pharmacological studies depending on these specific ethnic and folk information obtained from local practitioners, have shown that some of the components and extractives of *Dendrobium* species displayed anti-tumor⁴, anti-platelet aggregation⁵, anti-mutagenic⁶, anti-angiogenic⁷ and immuno-regulatory activities⁸. The search for new biologically active compounds from these plants disclosed a series of *Dendrobium* constituents such as alkaloids, stilbenoids, sterols, fatty acids, glycosides, bibenzyls, phenanthrenes, fluorenones, flavones, cinnamate, coumarins and sesquiterpenes⁹ which are partly responsible for its actions and indications of the herb in traditional remedies.

Dendrobium macrostachyum Lindl commonly known as 'Marathilotti' is one of the widespread *Dendrobium* species of South Indian orchids and is found abundantly in plains. It is an epiphytic herb, stem tufted, leaves membranous and deciduous during flowering season¹⁰. This plant is used as a painkiller by tying plant materials overnight on the parts of body to relieve from pain. The tender shoot tips are used as an ear drop for earache and also to treat boils, pimples and other skin eruptions¹¹.

The wide-ranging literature survey of the plant exposed that research work dealing the isolation and characterization of bioactive

molecules of *Dendrobium macrostachyum* Lindl have not been carried out. The present study was undertaken with a view to serve in the areas related to newer developments in natural drug research.

MATERIAL AND METHODS

The plant was identified and a voucher specimen (5/23/2011-12/Tech.785) was deposited in the Herbarium, Southern Regional Centre, Botanical Survey of India. The whole plant of *Dendrobium macrostachyum* was collected from Melattur (Table 1), near to Nilambur forest of North Kerala during December 2009. The plant materials were washed, stems and leaves separated, blended into small fragments. Then materials were shade dried and powdered using mixture grinder. The powders were passed through sieve No: 60 and a detailed macroscopical study of the powders were carried out. Fluorescence analysis and behavioural characteristics of the powders with different chemical reagents were conducted¹². The determination of various physicochemical constants such as total ash, water soluble ash and acid insoluble ash were carried out^{13, 14}. Preliminary phytochemical analysis was carried out using standard methods^{15, 16}.

Table 1: The topographical details on collection of *Dendrobium macrostachyum* Lindl

Place of collection	Details
Season	Winter
Location	Subtropical region, Hill area
Climate	Hot and Humid between 30° C to 20° C
Rainfall average	Annual 290 mm

RESULTS AND DISCUSSION

The dried powdered form of both stem and leaves of *Dendrobium macrostachyum* were found to be non-hygroscopic in nature. Organoleptic and powder analysis of the stem and leaves has been summarized in Table 2. Preliminary phytochemical analysis (Table 3) revealed the presence of alkaloids, flavonoids, glycosides, sterols, tannins, and phenols. Secondary metabolism in this plant appears to be a resource of many biologically active metabolites.

Table 4: Fluorescence analysis and behavioural characteristics of *Dendrobium macrostachyum* Lindl with different chemical reagents

Particulars	Under Visible light		Under UV light (366nm)	
	Stem	Leaf	Stem	Leaf
Powder as such	Pale green	Greenish brown	Dull green	Pale brown
Powdered drug + Conc. H ₂ SO ₄	Light brown	Dark yellowish brown	Pale brown	Yellowish brown
Powdered drug+ Aqueous NaOH	Dull green	Light green	Pale green	Light yellowish green
Powdered drug + Ferric chloride	Yellow	Yellowish Brown	Creamy yellow	Pale yellowish brown
Powdered drug+ Glacial Acetic acid	Pale green	Yellowish green	Light brown	Pale green
Powdered drug + Iodine	Light Brown	Yellowish Brown	Dark Brown	Brown

Table 2: Organoleptic and powder analysis of *Dendrobium macrostachyum* Lindl

Parameters	Observations	
	Stem	Leaf
Organoleptic analysis		
Touch	Rough	Spongy
Odour	Stringent	Pungent
Taste	Rancid taste	Stingy
Colour	Pale green	Greenish brown
Visual macroscopy	Coarse	Soft
Powder Analysis		
Powder triturate with water	Non sticky	Non sticky
Powder shaken with water	No foam	No foam
Powder treated with 5% aqueous NaOH	Brown	Yellow
Powder treated with 60% aqueous H ₂ SO ₄	Pale brown	Yellowish brown
Powder pressed between filter paper for 24 hours	No oil stain	No oil stain

Table 3: Proximate and phytochemical analysis of *Dendrobium macrostachyum* Lindl

Parameters	Results	
	Stem	Leaf
Moisture (Hot air Method)		
Moisture content (%)	49.14±0.89%w/w	83.12±1.26%w/w
Ash		
Total ash (%)	6.5±0.2	3.80±0.79
Water soluble ash (%)	4.12±0.4	1.69±0.12
Acid insoluble ash (%)	0.83±0.32	0.67±0.11
Phytochemical Screening		
Alkaloids (Mayer's reagent)	Positive	Positive
Flavonoids (Shinoda's Test)	Negative	Positive
Glycosides (Keller-Kiliani Test)	Positive	Positive
Saponins (Frothing Test)	Negative	Negative
Sterols (Lieberman-Burchard test)	Positive	Positive
Tannins (Ferric Chloride solution test)	Positive	Positive
Phenols (Ferric Chloride Test)	Positive	Positive

Values presented are mean of triplicates (mean S.D)

The physical constants such as the percentages of total ash, water soluble ash and acid insoluble ash, to measure the amount of the inorganic residual substances which provides a specific identification for this plant are tabulated in Table 3, along with its moisture content. The fluorescence analysis and behavioural characteristics with different chemical reagents are recorded in Table 4.

CONCLUSION

Plants with bioactive molecules have been attracting much attention for new medicine development. Tremendous progress has been made over the past decades on bioactive principles from orchids. The data presented here showed that numerous such constituents are to be disclosed from this plant. So it requires a pertinent research to examine the possible role of *Dendrobium macrostachyum* Lindl as a medicinally important herb.

ACKNOWLEDGEMENT

The authors are thankful to Mr. Biju Valsalan for help and support in manuscript preparation.

REFERENCE

- Arditti J. Aspects of the physiology of orchids. *Adv Bot Res* 1979; 7: 422-697.
- Robert L. Dressler. *Phylogeny and Classification of the Orchid Family*. Portland (USA): Cambridge University Press; 1993.
- Kong Jin-Ming, Goh Ngoh-Khang, Chia Lian-Sai, Chia Tet-Fatt. Recent advances in traditional plant drugs and orchids. *Acta Pharmacol Sin* 2003; 24: 7-21.
- Lee YH, Park JD, Baek NI, Kim SI, Ahn BZ. *In vitro* and *in vivo* antitumoral phenanthrenes from the aerial parts of *Dendrobium nobile*. *Planta Medica* 1995; 61: 178-180.
- Chen CC, Wu LG, Ko FN, Teng CM. Antiplatelet aggregation principles of *Dendrobium loddigesii*. *J Nat Prod* 1994; 57: 1271-1274.
- Miyazawa M, Shimamura H, Nakamura SI, Kameoka H. Antimutagenic activity of gigantol from *Dendrobium nobile*. *J Agric Food Chem* 1997; 45: 2849-2853.
- Gong YQ, Fan Y, Wu DZ, Yang H, Hu ZB, Wang ZT. *In vivo* and *in vitro* evaluation of erianin, a novel antiangiogenic agent. *Eur J Cancer* 2004; 40: 1554-1565.
- Zhao WM, Ye QH, Tan XJ, Jiang HL, Li XY, Chen KX, Kinghorn AD. Three new sesquiterpene glycosides from *Dendrobium nobile* with immunomodulatory activity. *J Nat Prod* 2001; 64: 1196-1200.
- Fan CQ, Wang W, Wang YP, Qin GW, Zhao WM. Chemical constituents from *Dendrobium densiflorum*. *Phytochem* 2001; 57: 1255-1258.
- Abraham A and Vatsala P. *Introduction to Orchids with Illustration and Descriptions of 150 South Indian Orchids*. 1st ed. Thiruvananthapuram (IND): Tropical Botanical Garden and Research Institute Press; 1981.
- Rama Chandra Prasad P, Sudhakar Reddy C, Raza SH, Dutt CBS. Folklore medicinal plants of North Andaman Islands, India. *Fitoterapia* 2008; 79: 458-464.
- Kokoshi J, Kokoski R, Slama FJ. Fluorescence analysis of powered vegetable drugs under ultraviolet radiation. *J Am Pharm Assoc* 1958; 47: 75-77.
- World Health Organization, Quality control methods for medicinal plant material. World Health Organization, Geneva 1998.
- Jaya Mathur, Pankaj Khatri, Kartick Chandra Samanta, Ashish Sharma, Subhash Mandal. Pharmacognostic and preliminary phytochemical investigations of *Amaranthus Spinosis* Leaves. *Int J Pharm Pharm Sci* 2011; 4: 121-124.
- Salna KP, Sreejith K, Uthiralingam M, Mithu A Prince, John Milton MC, Albin T Fleming. A comparative study of phytochemicals of *Andrographis paniculata* and *Murraya koenigii*. *Int J Pharm Pharm Sci* 2011; 3: 291-292.
- Kokate CK, Practical Pharmacognosy, Vallabh Prakashan, Delhi, 2000; 107-111.